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PETROLEUM DICTIONARY

for

OFFICE, FIELD AND FACTORY

by

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American Petroleum Institute

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HOLLIS P. PORTER

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PREFACE

Before deciding to publish this dictionary, a thorough search was made by the author while preparing lectures to be delivered to the students of the Petroleum Engineering School of The University of Tulsa, which revealed that there was no publication which defined in a satisfactory manner many of the words and terms used in the several departments of the petroleum industry. It was also observed, that many employees in offices were in need of a ready reference which would give them some light as to the meaning of technical as well as non-technical expressions, and words so often found in correspondence by and between individuals of the several departments of the industry. These facts furnished the inspiration for this publication. It is often difficult, and in many cases impossible, even with the best library facilities to find definitions for many of the words which have recently been introduced. This may cause some difficulty in understanding the meaning to one unfamiliar with the subject, or, to a particular branch of the industry.

This dictionary is offered to those who are employed or interested in the petroleum industry for the purpose of removing this difficulty. There are new terms constantly being adopted by the industry, the complete technical field includes Geology, Chemistry, Engineering, etc., consequently, it is not possible to include every word.

There are many possible words which have a slight connection with the industry which have purposely been omitted. Expert assistance has been employed to check and correct errors and to revise many of the definitions which have been gathered from words of other authors. Free use

has been made of material variously classed as glossaries and lists of terms published in periodicals; when these were found to be good they have been adopted as they were, or improved by adding another definition to the one given. The sole purpose being to create a dictionary by compiling and editing the material to the end that it shall be the best of its kind yet published.

The author realizes that it is next to impossible to create a new book which will be free from errors and complete in every detail; he, therefore, invites constructive criticism, which may be helpful in the future editions.

HOLLIS P. PORTER.

Tulsa, Oklahoma, June 1st., 1930.

REFERENCES

AND

ACKNOWLEDGMENTS

The following bibliography of books, authors and publications are given in acknowledgement of the valuable aid gained by their use as reference. Many of them are classed as glossaries, and some as works on some major subject, but containing a glossary of words and terms relating to the subject being treated.

Allen's Superintendents Hand Book.

Bacon & Hanor, American Petroleum Industry.

Day's Handbook of Petroleum Industry.

Functions of Natural Gas in the Production of Oil by Miller.

Inland Oil Index.

Methods in Petroleum Geology by Cox, Drake and Mulenburg.

Oil Encyclopedia by Marcus Mitzakis.

Oil & Petroleum Year Book by Walter E. Skinner.

Oil & Gas Journal.

Pan American Petroleum Glossary.

Petroleum & Allied Industries by Kewley.

Rathburn's Oil Data.

U. S. Bureau of Mines, Mineral Mining Industry.

Abel Closed Tester (Pensky-Martens).—An instrument for determining the flash point of oils. The Pensky-Martens is a modified form of the Abel. The flash test determined by the Abel closed tester is about 27°F. lower than given by the open cup method. The Abel tester is the English standard, while the Pensky-Martens has been adopted by the German Government.

Abney Level.—An instrument having a vertical graduated arc and a moveable vernier. It can be used also as a clinometer. A hand level with clinometer attachment invented by Captain Abney of the British Army.

Abscissa.—The horizontal reference axis in a graph or curve from which the height of the curve is measured. This is also called the "X-Axis" of the graph.

Absolute Atmosphere.—An absolute unit of pressure, equal to one million times the pressure produced on a square centimeter by the force of one dyne.

Absolute Pressure.—That measure of pressure which includes atmospheric pressure. Pressure expressed in absolute measure, commonly in absolute atmospheres. (Pressure reckoned from a vacuum).

Absolute Temperature.—The temperature measured from the absolute zero of temperature on the absolute or thermodynamic scale of temperature. This scale differs slightly from that of an air thermometer, and by the absolute temperature on the latter scale above the absolute zero. The temperature measured above the point at which heat ceases to exist. Absolute zero has never yet been attained experimentally but theoretically it is approximately 461°F. below the Fahrenheit zero (—461°F.) and 273°C. below the Centigrade zero (—273.1°C.).

Absolute Zero.—That point of temperature at which a body would be wholly deprived of heat, and at which a perfect gas would exert no pressure; supposed to be —273.1°C., or —461°F., —219° Reaumur; used on the only thermodynamic scale; as a theoretical consequence of the law of expansion by heat, a perfect gas at absolute zero temperature would be reduced in volume to nothing. That point of pressure at which a perfect vacuum is to be assumed.

Absorbers (Towers).—Apparatus in which gases or vapors are brought into intimate contact with a heavy absorbing fluid in which the vapors are to be absorbed. The absorbers provide an extended surface of the fluid so that the gases or vapors more quickly enter into solution. Absorbers are used in the manufacture of casinghead gasoline. (See Bubble Tower).

Absorption.—The apparent disappearance of one or more substances or forces by being taken into another substance or transformed into another form of energy. Generally absorption implies physical transformation. To condense and hold a substance usually a gas, on the surface of another substance, usually a solid; also to hold a mineral particle within a liquid interface.

Absorption Oil.—An oil containing little or no gasoline, used in the absorption process for extracting gasoline from natural gas. Mineral seal oil is preferred because of its viscosity, good absorbent power and low cost.

Absorption System.—A system of manufacturing natural (casinghead) gasoline in which the gasoline vapors are absorbed by contact with a heavy oil, the mixture afterwards being distilled to separate the gasoline from the absorbent oil. After distillation the oil is recirculated through the system, mineral seal oil absorption oil is generally used.

Accumulation.—Used to indicate that process by which oil and gas within the ground migrate into the more porous formations and there collect in quantity.

Accumulator.—A storage vessel for fluids under high pressure used with high pressure hydraulic systems for presses, hoists and elevators. It is placed between the pumps and presses and maintains a constant pressure on the line by means of a weighted piston, and at the same time is instrumental in absorbing pulsations due to the pistons of the pumps. A tank designed to receive condensed natural gasoline; a part of the equipment in a natural gasoline manufacturing plant.

Acetaldehyde.—Produced by the slow oxidization of alcohol.

Acetylene.—The most brilliant illuminating gas (C_2H_2); it may be produced synthetically from its elements by incomplete combustion of coal gas, and commercially from calcium acetylid (calcium carbide, CaC_2) by the action of water. It is used as a general anesthetic; for oxy-acetylene welding, cutting of metals, in organic synthesis and as an illuminant. It contains approximately 20,750 B.t.u. per pound. Acetylene gas is present in very small quantities in the unsaturated hydrocarbons produced by pyrogenic distillation, and in some synthetic fuels value and volatility of the benzol. It may also be used to "liven" alcohol.

Acetic Acid.—$C_2H_4O_2$ An acid formed by the decomposition of alcohol. A clear colorless liquid, miscible with water or alcohol. It is used as a reagent.

Acetone.—An inflammable liquid (C_3H_6O) with a biting taste, obtained by destructive distillation of acetates and various organic compounds. It is used in making chloroform and as a solvent for fats, camphor, and resins.

Acid.—A chemical compound which yields hydrogen ions when dissolved in water or a compound whose hydrogen can be replaced by metals or basic radicals, or which reacts with bases to form salts and water.

Acid Blow Case.—A small iron tank of heavy construction, from which the sulphuric acid used in the process of treating is blown by compressed air to the agitator. When the tank is of cast iron, it is usually termed an "egg."

Acid Coke.—A by-product obtained in treating dry-run-tar, at an elevated temperature with sulphuric acid; it is a soft, solid coke containing free carbon, complex heavy hydrocarbons, free sulphur, and sulphuric acid.

Acid (Fatty).—A characteristic constituent of animal and vegetable oils (fixed oils), all of this class of oils being compounds of alcohol radicals and fatty acid radicals. The fatty acids may be liberated by the application of heat when in contact with water, acids or alkalis.

When heated in this way the oil is said to be "saponified," and when the freed acid is brought into contact with a metal it forms a salt called a "Soap." There are a great number of fatty acids existing in fixed oils, such as stearic acid, oleic acid, palmitic acid, etc.

Acid (Free).—Uncombined acid contained in a compound or acid that remains unchanged in mixing it with another substance. Free acid in lubricating oils may be free mineral acid, petroleum acid, or fatty acid. Free sulphuric acid (mineral) in petroleum distillates is the uncombined acid left over from the refining process, but with modern processes this is practicaly a negligible amount. Free petroleum acid may have existed in the original crude oil or it may have been developed by decomposition of the oil during the refining process. Free fatty oil is present only in fixed oils or compounds of fixed oils with petroleum. Free mineral or fatty acids have a tendency toward corroding metal surfaces, but the action of the petroleum acids is comparatively weak.

Acid Heat Test.—The increase in temperature produced by adding commercial sulphuric acid to a petroleum distillate under standard test conditions.

Acid Restoring Plant.—An auxiliary department of certain refineries in which sludge acid is separated into acid oil, tar and weak sulphuric acid, with provision for reconcentrating the latter to 66° Be or 93.5 per cent acidity H_2SO_4 (commercial concentrated sulphuric color or odor.)

Acid Sludge.—The residue left after treating petroleum oil with sulphuric acid for the removal of impurities. It is a black viscous substance containing the acid and the impurities that the acid has separated from the oil.

Acid Treatment.—The process of agitating petroleum products, particularly gasoline, kerosene, and lubricating stock, with sulphuric acid, to remove compounds causing undesirable color or odor.

Acidity.—The amount of free acid remaining in an oil. It is generally given in terms of milligrams of oleic acid per cubic centimeter of sample.

Aclinic.—Without inclination or dip.

Actinic Light.—Light which produces either a chemical or physical change in a substance. White light, blue light, violet and green and generally actinic colors causing changes in light, sensitive substances, while red and orange are only slightly active.

Adamantine, or Shot Drill.—Sometimes employed in rotary drilling when very hard ground is met with. The method of working is as follows: A plain core barrel is attached and a small quantity of chilled steel shot or adamantine fed in with the water at intervals. These find their way beneath the core barrel and allow the water to pass where they are rotated and wear away the rock.

Adepsine Oil.—A name for liquid petrolatum supposed to have originated from animal matter.

Ader Wax.—Crude ozokerite in leafy masses.

Adhesion.—A molecular force by which bodies of matter are caused to stick together. That property of a fluid which tends to cause

it to cling or adhere to a solid surface. Adhesion is an important property of a lubricant.

Adiabatic Line.—The line indicating the relation between the pressure and volume of a gas, due to expansion or compression, when no transmission of heat takes place. In the process of compression the pressure rises faster than the volume diminishes, and the equation is $\frac{P_2}{P_1} = \left(\frac{V_1}{V_2}\right)^K$, (See Kent's Hand Book).
For air $K = 1.406$.

Aeolian.—An adjective applied to rocks formed of wind-borne sands. Some such aeolian sands yield large quantities of oil; practically all the big Baku gushers have been obtained from sands of this class.

Aerify.—To change into a gaseous form. To infuse or force air into; to combine with air.

Aerogene Gas.—The gas produced by the system of carbureting air devised by VAN VRIESTLAND. This system is installed at Breukelen, Holland, for both street and house lighting.

Aerometer.—An instrument for determining the density of gases.

Aeroplane Oil.—A cylinder lubricating oil of high viscosity, especially adapted to high compression heavy duty gasoline engines. For fixed cylinder engines this is a straight run mineral product. For rotating cylinder engines of the air-cooled type castor oil is frequently used. One grade in white, straight reduced viscous neutral oil having a gravity of 32¾° to 34° Be., a flash point of 415°F., a fire test of 480°F., a cold test of 20°F., and a viscosity of 185 to 200 Saybolt.

Affinity.—The selective tendency of elements to combine with one, rather than the other element, when the electromotive force and concentration are equal or slightly in favor of the "rejected" element.

Agitator.—A mechanical apparatus employed in refining petroleum to keep the oil in constant motion when it is treated with sulphuric acid. Agitation on a large scale is now performed by means of compressed air. The constant stirring due to the passage of the air, insures intimate contact between the acid and oil.

Aggregate.—The gathering of units into a whole or the crowding or clustering together of particles, as sand, gravel, shells, slag, or broken stone, or combination thereof, with which cement or bituminous material is mixed to form a mortar or concrete. "Fine aggregate" may be considered as the inert material which will pass a 1/4 inch screen and "coarse aggregate" the material which will not pass a 1/4 inch screen.

Agonic Line.—The line is also used for any declination; the line passing through all points at which the magnetic needle points to the true north.

Agrigentum.—Latin name for the Italian town of Girgenti on the south coast of Sicily, founded 582 B. C. Pliny and other Roman writers mention its oil wells and the oil extracted from that district, which was burnt in lamps under the name of Sicilian oil.

Air.—The mixture of gases that surrounds the earth and forms its atmosphere, composed by volume of 21 parts of oxygen, 78 parts of nitrogen; by weight of about 23 parts of oxygen and 77 of nitrogen. It contains also about 0.03 per cent of carbon dioxide, some aqueous vapor, and about 1 per cent argon. More precise proportions deducted from a combination of sources would give by volume 20.94 parts oxygen, 78.12 parts nitrogen and .94 parts argon.

Air Blown Asphalt.—By blowing air through residual oil, greater yields of solid or semi-solid asphalt are obtained than naturally exist in the oil. The action of the heated air blast gives a much more viscous asphalt product, and one which is less effected by temperature changes than the natural asphalt. It is not usually sufficiently ductile to be used for ordinary paving, but can be used successfully for waterproofing, as a filler in brick and wood pavements, for roofing, and for fluxing ductile asphalt.

Air Compressor.—A machine designed for pumping air or gas. It operates by movement of a piston which reciprocates within a cylinder, inlet valves open to permit the cylinder to fill, then the piston forces by means of compressing a discharge through other valves. Modern compressors are used in many industrial works where pneumatic tools are operated, and in the work of compressing air or gas for gas lift pumping of oil wells.

Air Drive.—Increasing the flow of oil in surrounding wells by forcing compressed air into centrally located wells.

Air Lift.—An arrangement for raising water or other liquid from a well or sump, air under pressure being introduced within the foot of an open ended pipe having a certain submergence. The column of liquid in the pipe, because of the introduction of the air, is made lighter than the submergence column outside, and an upward flow within the pipe results. The air or gas expansion plus the delivered propelling force adds factors to the unbalanced flowing fluid.

Air Pumping.—Pumping oil wells by means of the air-lift principle.

Air Propeller or Blowing Machine.—Apparatus used in hand dug oil wells for forcing fresh air to the bottom of the well in order to counteract the gaseous emanations which might prove injurious or fatal to the worker. The modern air ship is propelled by the scientifically designed air propeller.

Ajkite.—A resin related to succinite from Ajka, Hungary.

Albertite.—A jet-black, pitch-like brittle hydrocarbon possessing a conchoidal fracture and a specific gravity of about 1.1. It differs from ordinary asphalt in being only partly (about 30%) soluble in turpentine and in being only imperfectly fused when heated. It is used as fuel.

Albolene.—A brand of petroleum.

Alcohols.—A group of organic alkyl-compounds containing a hydroxyl group:

Methyl Alcohol, Methanol—$C H_3 OH$

Ethyl Alcohol, Ethanol—$C_2 H_5 OH$

Butyl Alcohol, Butanol—$C_4 H_9 OH$.

Alexjejevite.—A resin from the Kaluga Government, Russia.

Alidade.—An instrument used in topographical surveying and particularly in oil geology. It consists, in its simplest form, of a pair of sights affixed to a straight edge, so that the line of sight is parallel to the edge of the straight edge. As generally used, the sights are replaced by a telescope containing cross-hairs and stadia-hairs.

Aliphatic Hydrocarbons.—A group of hydrocarbons found in petroleum, the more important being members of the paraffin and olefine series. Methane, Ethane and Propane are examples in the paraffin series while Ethylene, Propylene and Butylene are examples in the olefine series. The carbon atoms in these compounds are bound to the hydrogen atoms in "Chain" form, hence are known as chain compounds. The paraffins may be expressed by the general formula $C_n H_{2n}$ while the olefines are $C_n H_{2n+2}$

Aliphatic Hydrocarbons from Polymethylenes.—According to French Patent 462073, Sept. 2, 1913, of the Steaua Romana Petroleum Ges. M. B. H., polymethylenes or mixtures containing polymethylenes particularly petroleum residuum or mineral oils of high boiling point, are subject to destructive distillation, and the products are converted into saturated hydrocarbons by treatment with hydrogen in the presence of a suitable catalytic agent.

Alkali.—In chemistry, any substance having marked basic properties. In its restricted and common sense, the term is applied only to hydroxides of potassium, sodium, lithium and ammonium. They are soluble in water, have the power of neutralizing acids and forming salts with them and of turning red litmus blue. In a more general sense, the term is also applied to the hydroxides of the so-called alkaline earth metals—barium, strontium and calcium. A class of caustic base, ash, soda, potash, having the common properties of being soluble in water and in alcohol, combining with fats to form soap neutralizing acids and forming salts with them, and changing the tints of many vegetable coloring matters.

Alkali Liquor.—The spent liquor left after washing petroleum products, such as kerosene with alkali. It usually contains phenols and sulphonates.

Alkali Test.—A purification test made on kerosene by adding caustic soda.

Alkalimeter.—An instrument for determining the quantity of alkali in a mixture.

Alkali Wash.—A process by which kerosene is treated with a solution of caustic soda, making it purer and more suitable for illuminating.

Alkyl-Sulphur Compounds.—Sulphur combinations occurring in petroleum in which the hydrogen content of the simple compound H_2S (hydrogen sulphide) has been wholly or in part replaced by organic radicals; such as $(C_2 H_5) HS$, $(C_3 H_7)_2 S$.

Allegheny Formation.—The second, in order of age, of the formations comprised in the Pennsylvania series of strata in the bituminous coal districts of the Northern Appalachian field. It overlies the Pottsville formation.

Allingite.—A fossil resin from Switzerland related to succinite.

Allotropic.—A term pertaining to the different modifications of

physical form which some elements possess; thus sulphur may exist as a crystalline solid, jelly-like paste, or as a liquid; carbon may exist in the form of gas, coal, diamond, etc.

Aloes Rope.—A special kind of rope, something used in oil-well drilling, the breaking strain of which is 300 kg. per circular centimeter. It is manufactured from the aloe, a plant indigenous to Cape Colony.

Altitude.—Vertical distance or elevation above any given point or base-level, as the sea; height; hence, also, such distance numerically expressed.

Aluminum Carbide.—($Al_4 C_3$). Decomposes in contact with water and liberates methane.

Aluminum Chloride.—Used as a catalytic agent in oil refining and for the removal of odor and color from cracked gasoline. It was once thought to increase the yield of gasoline but such has not been proved.

Aluminum Palmitate.—Used for compounding oils and greases.

Aluminum Stearate.—Used in lubricating oils, greases, and cutting compounds.

Amalie.—A proprietary name for liquid petrolatum.

Ambar.—The Russian name given to excavations dug around a derrick and forming small reservoirs where the sand from the well is deposited. Also used as a temporary reservoir for oil. Commonly called slush pit by American operators.

Ambrite.—An amorphous, greasy, yellowish gray oxygenated hydrocarbon which occurs in masses in Auckland, New Zealand; it is insoluble in ether, benzine and chloroform.

Ambrosine.—A yellowish to clove-brown resin found in the phosphatic beds near Charleston, S. C., it may be a modern resin which has been subjected to the action of salt water.

American Pump.—A special kind of baler used in oil fields for cleaning out wells. A sand pump.

Ameylene.—A hydrocarbon obtained by Hofer from American petroleum.

Ammonia.—(NH_3). A colorless, pungent, gaseous compound of nitrogen and hydrogen possessing strong alkaline properties. It will neutralize most acids and will combine with fatty acids to form ammonia soaps. The gas is also used in refrigeration.

Ammonia Oil.—An oil suitable for the lubrication of the cylinders of ammonia compressors. Low cold test is essential for this purpose.

Ammonium Sulphate.—A salt having commercial value which is obtained by the distillation of oil shales. It is a valuable by-product.

Amorphous.—Meaning "without form." A substance having no definite form of crystal.

Amorphous Graphite.—Uncrystallized graphite—finely divided.

Amortization.—The repayment of a debt, principal and interest, in equal annual installments. Frequently used in finance as the extinction of a debt, regardless of the means employed. Important in connection with mining finance. The return of invested principal through a sinking fund.

Amyl Acetate.—Called "Banana Oil" from its odor. Used principally as a solvent for lacquers, celluloid, etc.

Amyl Hydride.—This fraction in the distillation of petroleum was introduced as an anesthetic by J. Bigelow and B. W. Richardson in 1867.

Analysis (Proximate).—A partial analysis by which the compound is resolved into groups of compounds rather than into its ultimate elements. Thus, in the proximate analysis of coal, the quantities given are the volatile matter, moisture, sulphur, fixed carbon and ash, although most of these substances might be resolved into still more elementary form. It is purely a commercial analysis and is sufficient for practical purposes.

Analysis (Ultimate).—The separation of a compound into its "Ultimate" or smallest possible division or elements. Thus an ultimate analysis of coal gives the hydrogen, carbon, and sulphur without reference to the existence of minor compounds.

Analyzer.—That part of a polariscope that receives the light after polarization, and exhibits its properties.

Anchor.—A device for holding in place any object which may tend to change its position; designed to fasten down the casing of a well. An arrangement of rods attached to the casing plant for the purpose of holding down the christmas tree connections as in the case of high pressure wells; a length of tubing extended below the working barrel in a pumping well.

Aneroid.—A barometer used to measure atmospheric pressure by means of a vacuum chamber, the variations of which are shown by means of a pointer and dial. An instrument operated by atmospheric pressure to determine elevations above sea level.

Angle of Polarization.—The angle whose "Tangent" is the index of refraction or the amount by which a beam of light is bent in passing through a given substance.

Angle of Repose.—That angle at which the friction is sufficient to keep a body from sliding down an incline.

Angular Bearing.—A ringlike bearing which carries the weight or load acting at right angles to the length of the shaft (Radial load). An angular ball bearing carries the balls in a ringlike container surrounding the shaft.

Angular Velocity.—The angles or revolutions turned through in a given time, as in revolutions per minute, revolutions per second or degrees per second.

Anhydrite.—Prior to development of the Permian Basin area of the Southwest the petroleum geologist didn't often set us to pondering over this word anhydrite for he had few occasions to use it.

Its meaning becomes plainer when it is noted that it and its allied words hydrous and anhydrous bear a close relationship to the familiar combining form from a Greek word meaning water is seen in numerous common words, such as hydrometer, hydroplane. A hydrous substance is one that contains water in chemical combination. An anhydrous one is destitute of water. So the designation anhydrite is applied to the anhydrous or waterless calcium sulphate encountered in some drilling operations. Gypsum, or gyp familiar to every driller is also a calcium sulphate, and it is the same thing as anhydrite except that it contains water in chemical combination, while anhydrite, as its name implies does not. Anhydrite has the same variations in color that mark gypsum, but the driller usually may distinguish it by its greater translucency and by the fact that it is harder than gypsum. Gypsum is 2 in the scale of hardness. Anhydrite is 3 to 3½. An oxide of a non-metallic substance (Organic radical) capable of forming an acid when uniting with water, or capable of being formed from acid by removing the water, or of uniting with basic oxides to form salts.

Anhydrous.—Free from water of crystallization. Anhydrous salts are moisture free and are generally amorphous or without crystalline form.

Aniline.—A coal tar base from which dyes are made and which is also used in some composite gasoline to prevent detonation or preignition of the charge. It is an oily fluid.

Anneal.—To soften by heating process, thus reducing the brittleness and increasing the toughness or ductility. With steel the metal is heated to full red heat and is then very slowly cooled. With nonferrous metals, such as copper and brass, the material is quenched in water after heating.

Anthracite: Hard Coal.—A hard, black lustrous coal, containing 85 to 95 per cent carbon, as against 70 to 80 per cent in bituminous or soft coal.

Anthracoxenite.—This is obtained as a black powder from a resinoid material from the coal beds of Brandeisl near Schlan in Bohemia. The resin is treated with ether; schlanite dissolves while the insoluble portion constitutes anthracoxenite.

Anthraxolite.—Anthraxolite or anthracitic carbon is a black combustible coal-like substance of varying composition occurring in Ontario and Quebec.

Anticline.—A fold or arch of rock strata dipping in opposite directions from an axis, that is to say in a roof-like form.

Anticlinal.—Of, or pertaining to an anticline.

Anticlinal Bulges.—Expansions and elevations in the crests of definite anticlines or continuous folds.

Anticlinal Flexure.—Anticlinal Fold.—Resembling an anticline.

Anticlinal Line or Axis.—The medial line of a folded structure from which the strata dips on either side.

Anti-Clockwise.—Left-hand rotation, or opposite to the rotation of the hands of a clock.

Anti-Knock Gasoline.—A trade name for a special grade of gasoline which is supposed to have qualities which prevents detonation when used as fuel for a high speed gasoline engine.

Anytin.—A substance formed by the action of sulphuric acid on hydrocarbon oils.

Anytoles.—These are proprietary preparations in which substances like phenol, cresol, volatile oils, camphors, etc., are dissolved in water by means of anytin, a substance formed by the action of sulphuric acid on various mineral oils, resin oils and hydrocarbons. The ammonia salt of the hydrocarbons containing 10 per cent of chemically combined sulphur has been found the most useful solvent. The following are some of the anytoles which have been prepared: Phenolanytole, cresolanytole, meta-cresol-anytole, creosote-anytole, guaniacol-anytole, benzine-anytole, eucalyptol-anytole, peppermint-anytole, wintergreen-anytole, turpentine-anytole, camphor-anytole and iodine-anytole, all containing a good proportion of the active ingredient. It has been claimed for these anytoles that they are superior in bactericidal power to the disinfecting substances they contain. WILHEIM KOELZER has strongly commended meta-cresol-anytole in the treatment of erysipelas.

Apex.—The top of an anticlinal fold in strata, or axis of an anticline is that part of the structure which lies highest, like the edge of a roof. The highest point at which ore or rock is found in place between the walls of the vein, not a blow out or part of the broken down outside the walls.

A. P. I.—An abbreviation for American Petroleum Institute.

Applachian Field.—The oil fields located in the eastern part of the United States, and in general east of the Appalachian mountains, which extends to Ohio and Kentucky.

Apron Dressing.—An oil for leather aprons used in wool carding.

Apron Ring.—The bottom ring of plates of an oil storage tank.

Aqua Ammonia.—A solution of ammonia gas in water.

Aquadag.—Very finely divided Acheson graphite containing tannin and ammonia which when mixed with water produces a fluid lubricant.

Araeo-Pignometer.—A device for determining the specific gravity of oil by a weighing process. Suitable when very small quantities of the sample are available.

Aragotite.—A peculiar kind of bitumen found in the Sulphur Springs district of California, and also in the quick-silver mines of Lake Yola and Santa Clara counties in the same state. Not to be confused with argonite. A volatile hydrocarbon said to be related to idrialite; it occurs at the New Almaden and Redington mines, California, in bright yellow scales.

Arba.—A small cart formerly used in Baku for transporting the oil from the wells to the refineries.

Arch (Smoke).—A firebrick arch placed over the grates of a boiler and heated to incandescence. It oxidizes the volatile hydrocarbons and thus produces smokeless combustion.

Archimedean Screw.—A spiral screw fitting closely in a tube for

raising water or other liquids, often used as a screw conveyor for grain, sand gravel, and fine ore.

Areal Geology.—That branch of geology which pertains to the distribution, position and form of the areas of the earth's surface occupied by different sorts of rock or different geologic formations, and to the making of geologic maps.

Arenaceous.—An adjective applied to rocks that have been derived from sand or that contain sand. Not to be confused with siliceous. When the geologist speaks of arenaceous rocks he means those derived from sand or containing sand. One isn't likely to see any connection between this word and the gladiatorial fights of ancient Rome, but there is a very direct one, for it comes from the Latin word "arena" the central area of the amphitheater, which was covered with sand to absorb the blood. The arenaceous rocks are mechanical sediments produced by the disintegration and removal of siliceous rocks through the action of atmosphere, rain, rivers, frost, lake and ocean waves and other natural agencies. They should not be confused with siliceous rocks, those which contain silica.

Areometer.—An instrument for measuring the specific gravity of liquids, a hydrometer.

Argillaceous.—Claylike.

Argon.—A colorless, odorless gas contained in the air, of which it constitutes almost 1 per cent by volume.

Aromatic Compounds.—Compounds derived from the hydrocarbon benzene ($C_6 H_6$), distinguished from those derived from methane (CH_4).

Aromatic Series (Benzine Hydrocarbons).—This series of hydrocarbons embraces such coal tar distillates as Benzene ($C_6 H_6$). Tolouene ($C_6 H_5 CH_3$); Naphthalene ($C_{10} H_8$), and Anthracene ($C_{14} H_{10}$). The carbon atoms are arranged in ring form, hence this is known as a "Ring" series of compounds. While found principally in coal tar distillates, the aromatics are also found to some extent in certain California petroleums. They can also be formed from paraffin and naphthene hydrocarbons by pyrogenic decomposition at temperatures above 1000° F.

Artesian Well.—A well bored down to a point, usually at considerable depth where the water pressure owing to the conformation of the strata is so great as to force the water to the surface. Often applied to any deep bored well, even where pumping is necessary.

Artificial Vaseline.—Another name for German vaseline.

Ashpit.—The space below the grate bars in a boiler furnace; or the space below the combustion chamber in a boiler.

Asphalt.—Solid or semi-solid native bitumen obtained by refining petroleum or solid or semi-solid bitumen which is a combination of the bitumens mentioned with petroleums or derivatives thereof, which melts on the application of heat, and which consists of a mixture of hydrocarbons and their derivatives of complex structure largely cycle and bridge compounds. A dark-colored and more or less viscous to solid hydrocarbon complex, including: (a) the easily fusible bitumens often associated with a mineral matrix, not having

a "waxy" or unctuous feel; (b) Fusible residuums obtained from the distillation, oxidation, sulphurization, etc., of bitumens.

(a) **Natural.**—Resulting from a slow natural process or metamorphosis known as natural asphalts ("mineral pitches.")

1. Occurring in a fairly pure state.
2. Associated with a mineral matrix (e. g., calcareous, silicious or earthy.)

(b)—**Artificial.**—Resulting from the distillation, oxidation, etc., of mineral oils; known as petroleum asphalt ("petroleum pitches").

1. Straight petroleum asphalt.
2. Cut back.
3. Blown (oxidized) petroleum asphalt.
4. Dubbs' (sulphurized) petroleum asphalt.

Asphalt-Base Petroleum.—Asphalt-base petroleums are those which yield an asphalt residue on evaporation or distillation as contrasted with those that yield paraffin. They contain asphalt and no paraffin. They are distilled to asphalt and the distillates are cut according to gravity; such oils do not yield steam-refined cylinder stock or paraffin wax.

Asphalt Block Pavement.—A pavement having a wearing course of previously prepared blocks of asphaltic concrete.

Asphalt Cement.—A fluxed or unfluxed asphaltic material, especially prepared as to quality and consistency, suitable for direct use in the manufacture of asphaltic pavements, and having a penetration of between 5 and 250.

Asphalt Content.—The percentage by weight of 100-penetration asphalt contained in the substance tested.

Asphalt Earth Pavement.—A pavement containing a mechanical mixture of asphalt with finely divided earthy material, such as clay.

Asphalt Flux.—An oil used to reduce the consistency or viscosity of hard asphalt to the point required for use. A thinner.

Asphalt Furnace.—A portable furnace in which asphalt is heated for use in roofing, paving, etc.

Asphalt Macadam.—A broken stone pavement laid in a manner similar to ordinary macadam, except that the broken stone of the wearing course is coated and filled with asphalt applied by the pouring method after the stone has been placed on the road. Such appliances may be made with hand pouring pots, or with mechanical pressure distributors.

Asphalt Mastic Pavements.—Asphalt mastic is a mechanically mixed asphalt mixture which is heated and mixed over a comparatively long period of time, forming a mass which may be poured into a place and put into form by troweling, and which, when allowed to cool, sets in the required conditions. This distinguishes it from sheet asphalt or asphaltic concrete mixtures, which are usually compressed into place, and which usually do not contain as much asphalt as the mastic pavement.

Asphalt Method.—A method of determining the amount of asphalt in oil.

Asphalt Rock or Stone.—A dark coloured bituminous limestone found especially in France and Switzerland and is used practically all over the world as a material for pavement. The name applied to a stratum of sandstone or limestone when more or less saturated with asphalt. A rock impregnated with asphalt, usually the result of the evaporation of the lighter constituents of petroleum.

Asphalt Rock Pavement.—One having a wearing course of previously prepared blocks of asphaltic concrete.

Asphaltenes.—The components of the bitumen in petroleum, petroleum products, malthas, asphalt cements, and solid native bitumens, which are soluble in carbon disulphide, but insoluble in naphtha (petroleum spirit.)

Asphalt Flux.—The asphaltic flux is differentiated from paraffin flux and semi-asphaltic flux by a greater density, (nearly that of water) by the absence of hard paraffin scale, and by the fact that the unsaturated hydrocarbons predominate. It yields a larger amount of ash-free residual coke on ignition than other fluxes. Those from California petroleum contain less sulphur than that produced from Trinidad oil.

Asphaltic Pyrobitumens.—Pyrobitumens which are infusible, largely insoluble in carbon bisulphide, and relatively free from oxygenated compounds, (Elaterite, Wurtzilite, Albertite and Impsonite) natural asphaltic substances, generally containing less than 10 per cent of mineral matter, and characterized by their hardness and infusibility and the bitumen yielded on destructive distillation. Black in color, these four classes of substances merge or grade into one another, so that they may be roughly distinguished from one another by their bright to dull surfaces, and their conchoidal to hackly fractures.

Asphaltic Sands.—Natural mixtures of asphalts with varying proportions of loose sand grains. The quantity of bituminous cementing material extracted from the sand may run as high as 12 per cent, and this bitumen is composed of a soft asphalt which rarely has a penetration as low as 60.

Asphyxia.—Suspension of respiration as when suffocated by noxious gas. It is not uncommon for workmen in oil fields to be so affected.

Astatki—Ostatki.—A Russian name for a petroleum residue now used as fuel. Until 1870 it was considered a useless article and was disposed of by burning in open pits near the refineries.

Astraline.—A Russian petroleum product possessing the specific gravity 0.850 to 0.860, a flash point not less than 50° C. (122° F.), and of a pale yellowish color.

Assessment Work.—The annual work upon an unpatented mining claim on the public domain necessary under the United States law for the maintenance of possessory title thereto.

Asymetrical.—Having no axis, no plane, no symmetrical center. Not symmetrical; disproportionate.

Atmosphere.—The free air surrounding the earth. The pressure of the air at sea level averages 14.7 pounds per square inch, or "One atmosphere."

Atmospheric Pressure.—The pressure of air at the sea level, exerted equally in all directions. The standard pressure is that under which the mercury barometer stands at 760 millimeters, or 30 inches. It is equivalent to about 14.7 pounds to the square inch.

Atoleine.—A name for liquid petrolatum.

Atolin.—A name for liquid petrolatum.

Atom.—According to the atomic theory the smallest particle of an element that can exist either alone or in combination with similar particles of the same or of a different element; the smallest particle of an element that enters into the composition of a molecule.

Atometer—Gravimetroscope.—Used for determining evaporation rate of liquids.

Atomic Weight (Combining Weight).—The weight of an elementary atom in relation to an atom of hydrogen, the hydrogen atom being taken as unity. The atomic weight is used in calculating the quantities of the various elements entering into a compound. The weight of the molecule or the molecular weight is the sum of the weights of the atoms forming that molecule or chemical compound.

Atomicity.—The atomicity of an elemental molecule designates the number of atoms that form the molecule, and is numerically equal to the molecular weight divided by the atomic weight. An elemental molecule is monatomic, diatomic, atomicity as 1, 2, 3, or 4.

Atomization.—The method by which a jet of steam or compressed air is made to divide a fluid finely, as in an oil-burning furnace. An apparatus for converting liquid into spray.

Atomization of Liquid Fuel.—The method by which a spray of steam or compressed air is made to strike the oil admitted into the furnace, so as to disperse it into a finely divided state over the floor of the furnace, thus dividing the heat more equally.

Atreol.—A petroleum product produced by the action of sulphuric acid on certain petroleum distillates. Properly defined and combined with ammonia it produces the active principle of atreol-ammonium atreolate. It is soluble in water and alcohol, and is miscible with petroleum lanolin.

Atwood Cracking Process.—A method of producing light gasolines and illuminating oils from heavy oils, paraffine, etc. The oil is cracked at atmospheric pressure, and the apparatus provides for the return of heavy vapors for further cracking.

Auglaize.—Rich oil and natural gas region in the Lima district of Ohio, U. S. A.

Automatic Oil.—An oil for automatic screw machines.

Automobile Oil.—A prominent producer has supplied the following information:

"Light" automobile cylinder oil is a light bodied oil, possessing a gravity of 30° Be., a fire test of 475°F., and a Saybolt viscosity of 210. It is pale in color and runs freely at 15°F. It is recommended for its use in cylinders of water cooled gasoline cars.

"Medium" automobile cylinder oil possesses a gravity of 29.5° Be., a fire test of 480°F., and a Saybolt viscosity of 265. It is pale in color and runs freely at 15°F. It is recommended for use in the cylinders of air, or water-cooled gasoline automobiles.

Automobile Transmission Gear Oil.—A cylinder stock having a gravity of 25° Be. and a viscosity of 245 is recommended for automobile transmissions.

Autun Shale Oil.—A name applied to certain kind of illuminating oil, so called through being extracted from the bituminous shale found at Autun, in France.

Auxiliaries.—The smaller machinery of power plant such as the feed water pumps, condensers, condenser pumps, heaters, etc.

Avogardro's Law.—Equal volumes of all substances, either elemental or compound in the gaseous state, at the same temperature and pressure, contain an equal number of molecules.

Avoirdupois.—The system of weights used in England and the United States for the ordinary purposes of trade of which the fundamental unit is the pound of 16 ounces of 7000 grains. The avoirdupois pound is equivalent to 14.583 troy ounces, 453.6 grains.

Axis.—A straight line, real or imaginary passing through a body, on which the body revolves or may be supposed to revolve. A line passing through a body or system, around which the parts are symmetrically arranged.

Axis of a Fold.—A line determined by the intersection of the two limbs of a fold on any given bed at crest or trough. A line defined by intersection of any bed and a plane bisecting the angle between the limbs.

Axle Oil.—A natural lubricating black oil used for roughly finished machines or for the axles of cars. It has a medium viscosity and a low cold test. It is often called "Black Summer" oil.

Azelaicacid.—A crystalline compound formed by the action of nitric acid on castor oil.

Azimuth.—An arc of the horizon intercepted between the meridian of a place and the vertical circle passing through the center of a celestial body.

An arc in a horizontal plane; the angle and any course which a transverse makes with the meridian.

Azoic.—Formerly, that part of geologic time represented by the pre-Cambrian stratified rocks; also, the rocks formed during that time. Later restricted to the period and system now generally called Archean.

B

Babbitt Metal.—A soft white anti-friction metal used for lining bearings. It has varying compositions, but consists mainly of tin, copper and antimony. In very high grade heavy duty babbitts nickel is also sometimes used. Isaac Babbitt sold his special alloy of the following composition:

Per cent each,

83.12 tin
8.22 antimony
.34 lead
8.22 copper
.10 arsenic.

Back Band.—A band that goes over the brake drum of a bull wheel or other hoisting drum.

Back Lash.—Lost motion in working parts of a machine resulting from mechanical wear of the parts or inperfections in workmanship. Gears may have back-lash after the teeth have become worn.

Back Pressure.—A misnomer used by some authors who are attempting to describe a greater or less degree of pressure. Often used to describe pressure control, or resistance to flowing fluid.

Backsight.—Used when making a survey with a transit. When the instrument has been set up at a given point a back sight is taken at a known point or object, and then the angle can be read in degrees as the instrument is turned to a new object.

Back Twist.—There is always a tendency on the part of the drilling cable, either wire or manila, to twist in the same direction as its lay. To overcome this action of the cable, the driller after running the tools into the hole raises them clear of the bottom. Then before clamping on he gives the cable a complete turn in the direction opposite to its lay for each 100 ft. of depth. Thus, if the hole were 2,000 feet deep, he would give a right lay line 20 turns to the left. In the vernacular of the derrick floor this is a back twist. The back twist is performed with a wrench made especially for the purpose.

Baffle Plate.—A plate placed in a tank or other receptical which controls the direction of flow of a gas or fluid. It is a guide plate placed to divert the stream.

Baffler.—A device used for controlling the flow of lubricating oil supplied by oil pumps the resistance to flow being controlled by increasing or decreasing the effective length of a small oil passage.

Baikerite.—A waxy substance taken from rock seams and containing about 60 per cent of ozokerite. It is found in the vicinity of Lake Baikal.

Baikerinite.—A thick tar-like fluid at 15°C., which constitutes 32.61 per cent of baikerite.

Bailer.—A long cylindrical sheet-iron vessel fitted with a valve at its lower extremity used to remove water, sand, mud and oil from a well. When fitted with a plunger to which the line is attached it sucks the materials in as it is lifted, and is then called a sand pump. Also called American pump.

Bailing Tub.—A wooden tank about 6 feet in diameter by 6 feet

in height placed on trestles over the mouth of an oil well, and into which the bailer is emptied. Seldom used in America, but used in some countries when oil is being recovered by bailing.

Bakelite.—Condensation products of formaldehyde and phenol or cresol, invented by L. H. Backeland, used as plastics, insulating materials and synthetic resins, and in the production of lacquers.

Balance (Chemical).—A "Scale" used for weighing. It has two pans, one of which contains the weights and the other the mass to be weighed.

Balance (Gas).—A balance used for determining the specific gravity of gases.

Balance (Specific Gravity).—A balance specially designed for determining specific gravity by weighing methods.

Bailing Drum.—A light winding drum from 10 to 18 feet in circumference, fixed in the derrick, usually driven by belting from a motor, around which the rope used in letting down the bailer is coiled. A winding drum placed in an oil derrick which carries the rope running to the bailer. It is driven by power. In America a sand reel placed outside the derrick near the band wheel is used to wind the sand line which is attached to a bailer.

Bailing Ropes.—Bailing lines constructed of fine steel wire. See: (Sand line).

Ball Bearing.—A machine bearing a supporting part which utilizes hard metal balls in a circular race to carry or to support a shaft or a journal.

Ball and Ring Method.—A method of testing the melting and softening temperatures of asphalt waxes or paraffine.

Ball and Seat.—The renewal parts of deep well pump valves. A ball and a seat is to be found in each standing and each traveling valve.

Band.—A strip inclosing and binding together some objects. A belt; an endless strap.

Band Wheel.—A large pulley over which the main driving belt runs. It varies in dimensions from 9 to 11 feet in diameter and 10 to 20 inches face. It drives the main crank shaft, and sometimes a friction sand reel. The main crank shaft drives the walking beam, calf wheel, etc. Special conditions may demand larger band wheels.

Barefooted.—A condition of a well which is drilled into the pay rock which has a sufficiently substantial formation to be unnecessary for casing perforated pipe, or screen, and it is finished without the use of same.

Barium Chloride.—Used for testing for sulphuric acid or as a catalytic.

Barograph.—A self-recording barometer which traces on a roll of paper a graph of the pressure variations.

Barometer.—An instrument for determining the weight or pressure of the atmosphere and hence for judging of probable changes of weather, or for ascertaining the height of any ascent, etc.

Barracks Shale.—One of the principal oil-shale seams of Scotland.

Barrel.—A cylindrical wooden vessel made of staves and bound

with hoops; an iron or steel vessel of cylindrical shape for the transport of oil. One barrel of oil equals 42 gallons (U. S. A.), or approximately 35 British Imperial gallons. The old liquid measure gave 31½ gallons as a barrel, and 42 gallons equal 1 tierce.

Base.—A compound capable of reacting with acids to form salts; the artificial foundation of a pavement. A residuum from the distillation of petroleums. When paraffin is obtained from the petroleum the original oil is said to have a paraffin base; when the residue is entirely asphaltic, the original petroleum is said to have an asphaltic base. Some petroleums have both an asphaltic and a paraffin base and are therefore called paraffin-asphalt petroleum. A foundation or supporting portion of a structure or other object.

Base Line.—A line from which all measurements are taken.

Base Map.—A map, usually drawn with considerable accuracy which serves as a base for geological work.

Base Petroleum.—Petroleums are divided into two principal classes. Paraffin base oils carrying a predominating amount of paraffine in the residuum, and Asphaltic base oils which have a greater percentage of Asphalt than paraffine.

Basset.—An outcrop or the exposed edge of a stratum.

Batch Oil.—A pale lemon non-viscous neutral oil having a viscosity of about 80 Saybolt at 70°F. Used principally to prevent the adherence of moulded materials to the molds or as a lubricant in cordage manufacture.

Batch Still.—A still without connections for continuous feed or outflow; a discontinuous still.

Bath (Laboratory).—An outer vessel filled with sand, water, tolouol, or salt into which an inner vessel is introduced, the latter containing the material that is to be heated. The layer of sand, water, etc., between the inner and outer vessels controls the temperature of the flame and distributes it evenly over the material.

Bath (Lubrication).—A method of lubrication in which the shaft dips in a pool or bath of oil, the surface of the shaft being at all times immersed in oil.

Bath (Quenching).—A tank of tempering oil, water or mercury used for "Quenching" heated metal in hardening processes.

Bathvilite.—An amorphous, fawn-brown, opaque, oxygenated hydrocarbon from Torban Hill, Scotland; it is insoluble in benzol and is related to Torbanehill mineral.

Battery.—A series of stills, tanks or boilers set in continuous masonry, or set separately, but operated by means of common connections.

Baume' Gravity.—(Be.') An arbitrary scale for measuring the density of liquids. For oil which is lighter than water, and when the temperature is 60°F. the scale gives the gravity of water as 10, while the specific gravity of water is 1.0, and the scale gives a gravity of 70 for a liquid which has a specific gravity of .70. Thus, it will be seen that the Baume scale bears an inverse ratio to the specific gravity scale. The Baume scale for liquids lighter than water has the following relation to specific gravity:

$$\text{Specific gravity} = \frac{140}{130 + \text{Degrees Baume.}}$$

This equation embodying the modulus 140, is indorsed by the U. S. Bureau of Standards. The American Petroleum Institute has adopted the modulus of 141.5 instead of 140, and the A. P. I. formula is now generally accepted.

Baume Hydrometer.—An instrument used for measuring the Baume density of a fluid. This is in the form of a straight glass tube which is floated on the fluid in question, the level of the fluid coming in line with the graduations of the scale marked on the neck of the hydrometer.

Baume System.—Density of oil is usually measured in degrees Baume. The instrument used was invented by French chemist, Baume, and consists of a sealed hollow tube with standardized graduations, which is floated in the oil. The heavier the oil, the less distance it sinks and the lower the reading, and vice versa.

Bauxite.—A mineral used in the manufacture of aluminum.

Bbl.—Abbreviation for barrel. See: Barrel.

Beaker.—A cylindrical glass vessel, somewhat like a drinking glass, but generally with parallel sides and flared rim and pouring lip. Used in the laboratory.

Beam Hanger.—Attached to the end of the walking beam above the well bore to actuate the pumping rods in the well. A steel hanger used to suspend the sucker rods in a well from the end of the walking beam.

Beam Well.—A well being pumped or operated with a walking beam.

Beaman Stadia Arc.—A logarithmic calculator for solving right triangles, fixed to the vertical arc of a transit.

Bearing (Brg.)—A support for a revolving shaft. The amount of load or surface in a bearing. Two surfaces are said to be "Bearing Surfaces" when one rests on the other and transmits a load between the two. The direction of a line as referred to the cardinal points of the compass; such as N. 10 E., or S. 45 W.

Bearing (Outboard).—A bearing provided for the extended shaft of a machine or a bearing that is outside of the machine structure proper. Thus in a steam engine, an outboard bearing is provided for the extended shaft carrying a direct connected electric generator.

Bearing (Projected Area).—The area (flat area) obtained by multiplying the diameter of the bearing by its length. It is not the area measured around the circumference.

Bearing (Ring Oil).—A self-oiling in which the oil is taken out of an oil well by means of loose revolving rings hung on the shaft. The lower edge of the ring dips into the oil and the rotation of the ring continuously conveys oil and deposits it in the bearing as long as the shaft rotates.

Bearing Shims.—Packs of thin strips or sheets placed between the two halves of a split bearing for adjustment. Removal of one or more of these strips or "shims" brings the halves of the bearing closer together and thus takes up for wear.

Bearings (Ball and Socket).—A pivoted bearing arranged with a spherical enlargement which is supported by a cup shaped socket. The bearing is thus free to move to accommodate the irregular motion of a bent or deflated shaft.

Bearings (Self-Aligning).—Bearings of the ball and socket, or other pivoted type which are free to move with the shaft when the latter is bent, deflected, or out of line.

Bearings (Step).—Thrust bearings arranged to take the load along the length of the shaft, or to take up the weight on a vertical shaft.

Bearings (Unit Pressure).—The load per square inch of projected area coming on a bearing surface.

Beau de Rochas Cycle.—The old name for the four stroke cycle engine. A power stroke is performed every second revolution, or in every four strokes of the piston.

Bed.—The smallest division of stratified series, marked by a more or less well defined divisional plane from its neighbors above and below. The body of the main frame of an engine or compressor.

Bell Socket.—A fishing tool.

Belt.—A band or ring surrounding some object. A band connecting two pulleys for the purpose of transmitting power.

Belt Clamp.—A clamp used extensively in the oil producing field for the purpose of attaching the ends of a belt.

Belt Fastener.—See: Belt clamp and belt lace; various designs of clamps, clips and patented fasteners are on the market.

Belt Lace.—A lace of steel wire, rawhide and other suitable material used to attach the ends of a belt.

Belt Stretcher.—A set of clamps with screws or other means provided to draw a belt tight so the end may be fastened.

Bench.—An outcropping bed which forms a conspicuous relatively horizontal ledge. A location for a permanent reference mark, or a support given to a known elevation, used in engineering surveys when running levels.

Bench Level.—A level used in setting up a machine to bring its bed into an exactly horizontal position.

Bench Mark.—A point known elevation so marked that it can be again found and used.

Bend.—A curved length of pipe struck to a larger radius than the elbow. Pipe bent to 45, 90 or 180 degrees is often specified as ⅛, ¼ or ½ bends. A slight bend is often called a spring.

Benzene.—A hydrocarbon, discovered in 1825 by Faraday in a tarry liquid, resulting from the distillation of coal tar or gas tar. An aromatic hydrocarbon. (C_6H_6).

Benzine.—A light volatile inflammable hydrocarbon obtained by the fractional distillation of crude petroleum. This includes the commercial products known as "Gasoline" and "Naphtha," and in general all hydrocarbons which distill off below 450° F. the gravity depends upon the crude from which it is made, but ordinarily ranges from 50° to 68° Baume. Benzine is the name of a group of fluids rather than of single distinct homogenous compound. Benzine is the first product to pass off in the distillation of crude petroleum, and when redistilled yields gasoline and naphtha. This must be distinguished from BENZENE which is a coal tar product.

Benzine-Naphtha.—A naphtha having a gravity of 70° Baume. It is made by treating and redistilling crude naphtha of the gravity of 68° to 80° Baume.

Benzinum.—A distillate from American petroleum consisting of hydrocarbons chiefly of the marsh-gas series.

Benzol (Benzene), (Phenyl Hydride) (Coal Tar Naphtha).—Commercial benzene used as a motor fuel and also as a plant or varnish remover. It is a coal tar distillate, a hydrocarbon of the aromatic series, and ordinarily is furnished as 90 per cent benzol, or 90 per cent pure benzine. In some cases, however, a blend of benzol with a petroleum product is marketed which is sold under the name of benzol. Benzol is much used in "Composite fuels" in which it is blended with gasoline or naphtha and sometimes with alcohol.

Benzoic Acid.—An acid used as a fuel for calibrating or standardizing bomb calorimeters. It has a uniform heat content of 6.325 calories.

Benzoyl.—The commercial name applied to a mixture of substances, including benzine and its homologues.

Berea Sandstone, Berea Grit.—A rock formation consisting of fine-grained sandstone and grit, generally considered as the base of the Carboniferous system in Ohio. It is one of the principal oil-bearing formations of the State.

Bermuda Asphalt.—A relatively pure black bitumen. It is soft, breaks with a conchoidal fracture, and melts at a low temperature. It takes its name from the state of Bermudez in Venezuela, where two large deposits have been found. Its chief use is in the paving industry.

Beta-Jaulingite.—A brownish yellow resin, obtained from the residue of jaulingite, after treatment with carbon disulphite, by the action of ethyl-ether.

B. H. P.—Abbreviation for Brake Horsepower.

Big Injun.—An oil and gas producing sandstone of Pocono formation in Pennsylvania, U. S. A.

Big Lime.—A term that has been applied to lime formations in several eastern as well as western fields and reference is made to Big Lime of eastern Ohio fields, Westbrook Field, Texas; Petrolai Field, Texas, Southwestern Clay County, West Virginia and the Yates Pool, Pecos County, Texas.

Binary Heat Engine.—An engine using two working fluids, one being water while the other is some volatile fluid such as ether, sulphur dioxide, or alcohol. The heavier fluid receives the heat from the combustion directly, and the exhaust from this first cylinder is used to vaporize the light secondary fluid which performs work in a second cylinder.

Binary Molecule.—A molecule with two atoms.

Binder.—A foreign or fine material introduced into the mineral portion of the wearing surface of a pavement for the purpose of assisting the road metal to retain its integrity under stress, as well as, perhaps, to aid in its first construction. The course is a sheet asphalt

pavement, frequently used between the concrete foundation and the sheet asphalt mixture of graded sand and asphalt cement.

Binocular Hand Level.—A hand level with two sighting tubes.

Biscuit Cutter.—Short cores sometimes obtained with standard tools, however, by use of a short core barrel sharpened at the bottom and run on the jars this barrel, 6 to 8 inches long, is forced into the formation by jarring. The operation is so like that employed in the kitchen in cutting out dough for biscuits designated as "biscuit cutter."

Bit.—A tool used in drilling oil wells. There is a great variety of bits for both cable tool and rotary drilling. The bit does the cutting at the bottom of the hole. An auger or drill used by mechanics for boring holes.

Bit, Dics.—A bit with two or more rolling discs which do the cutting. A special bit used in certain formations when drilling by rotary method.

Bit, Fish Tail.—A bit with cutting edges shaped like a fish's tail.

Bit Gage.—An iron ring of known diameter used to test the bit during dressing to determine when it has reached correct size.

Bit Hook.—A tool for straightening a lost bit in the hole.

Bit, Rock.—A rotary bit with knurling cutters for hard rock.

Bits, Blank.—The steel blanks before the diamonds are set in them for diamond drilling.

Bitulithic.—A kind of paving consisting of broken stone cemented with bitumen asphalt.

Bitumen.—A mixture of native or pyrogenous hydrocarbons and their non-metallic derivatives which may be gases, liquids, viscous liquids or solids, and which are soluble in carbon disulphide. A naturally occurring hydrocarbon complex, often associated with mineral matrix, insoluble in water, but largely soluble in carbondisulphide, benzol, etc. Its color and hardness are variable. A general name for various solid and semisolid hydrocarbons. In 1912 the term was used by the American Society for Testing Materials to include all those hydrocarbons which are soluble in carbon bisulphide, whether gases, easily mobile liquids, viscous liquids or solids. To distinguish bitumen intermediate in consistency between asphalt and the more liquid kinds of crude petroleum, the term **Maltha** is frequently employed. A black hydrocarbon of plastic or semi-fluid from having the appearance of tar. Sometimes called "Mineral Pitch." It is relatively highly viscous, and is a wax like substance which gives natural asphalts their essential characteristics. It is soluble in carbon disulphide and burns with bright flame.

Bitumen (Natural).—This is a bitumen occurring in nature, probably produced by the evaporation and oxidation of oil seepages. It is an impure hydrocarbon containing various metallic salts.

Bituminous.—Containing much organic, or at least, carbonaceous matter, mostly in the form of the tarry hydrocarbons which are usually described as bitumen. Having the odor of bitumen. Often applied to plants.

Bituminous Coal.—"Soft Coal," or coal containing a high percentage of gas or volatile hydrocarbons, tar, and other compounds easily removed by distillation. When such hydrocarbons are distilled from the coal, a mass of solid carbon called "Coke" remains. Anthracite, or "Hard coal" contains very little of the hydrocarbon compounds and hence does not coke.

Bituminous (Liquid).—Materials having a penetration of more than 350 at 25°C. and loaded to 50 grams, load acting for 1 second.

Bituminous Macadam Pavement.—A pavement having a wearing course of macadam, with the interstices filled by penetration methods with a bituminous binder.

Bituminous Rock.—A rock formation occurring in nature saturated with bitumen or with petroleum residue.

Bituminous Sands.—Sands impregnated with bitumen. The quantity of bitumen which can be extracted from these usually amounts to from 8 to 20 per cent of the whole.

Bituminous (Semi-Liquid).—Having a penetration of more than 10 under 100 grams, acting for 5 seconds at 25°C., and penetration under 50 grams not more than 350 for 1 second.

Bituminous Shale.—A shale containing hydrocarbons or bituminous material; when rich in such substances it yields oil or gas on distillation; called also Pyroschist or Oil Shale.

Bitusol.—Dispersed solid colloids in solution in bitumen. A solution of bitumen containing solid colloids in solution. Trinidad Asphalt is said to be a true bitusol.

Black Jack.—Black crude oil used to grease mine car wheels. See: Black oil.

Black Oil.—A residue from petroleum or its distillates. It varies widely in character and is used as cheap lubricant. A heavy natural lubricating oil used for rough machinery. Black oils may be either residues from petroleum, or from its distillates. They vary widely in character and are used as cheap lubricants, on car wheels and on other places where the higher refined oils are not necessary. "Black oils" from Pennsylvania petroleum had these properties; gravity 23° and 26° Be.; flash point 450° and 365°F.; fire test 530° and 425°F.; Saybolt viscosity 84 at 212°F. and 50 at 212°F.

Black Satin Glass.—Lamp black.

Blackstrap.—A dark heavy oil used for lubricating mine-car wheels. A dark molasses by-product of sugar as produced from cane and used to manufacture stock feeds and alcohol.

Blank Flange.—A flange which is not drilled but which is otherwise complete, used to connect up pipe lines or parts of machinery.

Blanket.—A bituminous surface of appreciable thickness, generally formed on top of a roadway by the application of one or more coats of bituminous material and sand.

Blasting.—A method of loosening or shattering masses of solid matter, by means of explosive compounds. Where petroleum occurs in a dense hard rock, recourse must sometimes be had to the use of explosives, the effect of these being to set up a subterranean disturb-

ance, which may thus be the means of giving freer movement to the oil.

Blau or Blue Gas.—A mixture of volatile hydrocarbons, such as propane, butane, the pentanes, etc., containing hydrogen and methane, etc., in solution under pressure. The pressure solution is filled into steel cylinders, and is thus available for transport. Blau gas is used for illuminating, heating and power purposes.

Bleached Oil.—Oil decolorized by the action of chemicals or sunlight, the latter being called "Sun Bleached Oil."

Bleacher.—A rectangular or cylindrical upright tank having a roof provided with hatches or glass panels to allow escape of vapor or admit sunlight; a tank in which burning or lubrication oil is brightened.

Bleeder.—A connection located at a low place in a gas line, and by means of a small valve condensate, water, and oil can be drained from the line without discharging the gas.

Bleeding.—The exudation of bituminous material on the roadway surface after construction. The act of draining off liquid from a gas line, or water and B. S. from a tank of oil.

Blend.—A mixture of various kinds of oils having the same origin or of the same class. Thus, a blended oil may consist of various petroleum oils, or a blended animal oil may consist of various animal oils. When vegetable or animal oils are mixed with petroleum oil the result is a "Compound," not a blend.

Blending.—The addition of one oil to another so that the mixture or blend is homogenous in all its parts. By blending 40 per cent of natural gasoline which has a Baume gravity of 80 with 60 per cent of naphtha of 59 gravity, a motor gasoline 66 gravity is produced. Endless examples of blending can be given for motor fuels, lubricants, etc.

Blind Flange.—The flange used to close the end of a pipe. It produces a blind end which is also called a dead end. Sometimes a plate of steel inserted between flanges of a pipe line thus cutting off the opening through the line.

Blind Splicing.—Joining the ends of a rope or cable by laying out alternate strands of one and laying in the corresponding strands of the other so that the splice is difficult to detect.

Block and Fall.—See: Block and tackle.

Block and Tackle.—Consists of two blocks with sheaves in them when a rope is also included and is properly reeved.

Block Test.—A shop test for a motor or an engine to determine the power output efficiency of fuel or power consumed, etc.

Bloom.—The flourescence of petroleum and its products, especially lubricating oils. The peculiar iridescent gleam given by light reflected from the surface of the oil. It is of a varying phosphorescent character, and with the exception of rosin oil, exists only in heavy petroleum products. Other vegetable oils have no bloom. Generally paraffin base oils have a greenish bloom while asphaltic oils have a bluish bloom (when filtered).

Blow Off Cock.—A valve with plug valve design to use in blowing off mud from a boiler.

Blow Out.—A sudden or violent escape of gas as from a drilling well when high pressure gas is encountered and preparation to prevent, or to control the escape has not been made.

Blow Out Preventer.—A heavy casing head control filled with special gates or discs which may be closed around the drill pipe, or which completely close the top of the casing if the drill pipe is withdrawn.

Blown Asphalts.—By blowing the asphaltic petroleum residue with air at moderately high temperatures the yield of asphaltum is increased. Blowing also gives a more viscous product and one that is least affected by atmospheric changes.

Blown Oil (Crude During Distillation).—Superheated steam blown through the crude oil prevents decomposition of the hydrocarbons when the oil has been run down so far in the still that high temperatures are necessary for further products. The steam carries away the more volatile portions of the residue at a much lower temperature than the actual boiling point of the thickened oil, and thus prevents the decomposition of the asphaltic residue. When distilling for asphalt, the steam carries off much of the objectionable paraffine wax. Semi-solids or solid products obtained primarily by the action of air upon originally fluid native bitumens, which are heated during the blowing process. Also called condensed oils.

Blown Oil (Vegetable).—When a vegetable oil is "blown" by passing a stream of heated air through it, the oxidization increases the body or viscosity of the oil.

Blown Petroleum.—Blown petroleums are petroleum residuums, through which a jet of air has been passed during or just after distillation. Semi-solids or solid products obtained primarily by the action of air upon originally fluid native bitumens, which are heated during the blowing process.

Blue Oil.—A mixture of heavy oils and paraffin obtained in the distillation of ozokerite. In the Scottish shale-oil industry, the oil produced from heavy oil and paraffin by cooling and pressing for separation of hard paraffin scale; it is refined and fractioned into lubricating oils.

Body.—A term used to indicate the consistency or viscosity of a lubricating oil, or in other words, the fluidity of an oil. Thus we have heavy and light bodied oils depending upon whether they are thick and viscous, or light and fluid. The measure of that fluidity expressed in the number of seconds which a given quantity of the oil at a given temperature flows through an aperture. See viscosity.

Boghead Coal.—A dark brown variety of cannel coal, valuable as a source of paraffin oils and gas.

Boiling.—Heated to the point of bubbling; heaving with bubbles.

Boiling Capacity (Rating).—A boiler is rated by its ability to evaporate water at a standard pressure, or at and from a given temperature. The rate of evaporation is given in terms of the number of pounds of steam (water) per hour. While a boiler does not actually

develop power, yet it is given a standard horsepower rating which corresponds to the evaporation of 34.5 pounds of water per hour from and at a temperature of 212°F. (atmospheric pressure.)

Boiling Point.—The temperature at which a liquid begins to boil, or to be converted into vapor by bubbles forming within its mass. It varies with the pressure. In water, under ordinary conditions it is 212°F., or 100°C., but it becomes less with lessened atmospheric pressure, as in ascending a mountain, being lowered about 1°F., for every 550 feet of ascent. The temperature at which crude oil boils is located when it begins to give forth its different distillates. The boiling point of crude oils and the amount of distillates obtained at specified temperatures differ considerably.

Boiling Point (Final) (End Point), (Dry Point).—The temperature at which the final and heaviest "Fraction" of the petroleum is driven off in the process of distillation.

Boiling Point (Fractionating).—The temperature at which the various constituents of a mixture are vaporized or driven off. Thus, petroleum, which consists of a great number of different fluid hydrocarbons has a number of different boiling points, one for each "Fraction" of the oil.

Boiling Point and Impurities.—In general, the boiling point of a single fluid is raised by dissolved impurities in the liquid.

Boiling Point (Initial).—The temperature, at which the first drop of distillate falls into the receiver from the end of the condenser. This, of course, represents the vaporization temperature of the most volatile and lightest fluid contained in the mixture.

Boiler Efficiency.—The efficiency of a boiler is the relation of the heat delivered in the form of steam to the fuel heat actually applied to the heating surfaces. A more practical and common method is to express the weight of water evaporated per pound of fuel. Heat of steam divided by heat of fuel equals per cent efficiency.

Bolt Oil.—A viscous neutral oil having a gravity of 30° Be. and a Saybolt viscosity of 220, has been used for nut and bolt threads and is recommended for that purpose.

Bomb Calorimeter.—An instrument for measuring the heat content of fuels. A sample of the fuel being placed in a "bomb" or strong walled steel tube and burned in oxygen. The bomb is immersed in a given weight of water, and the rise in the water temperature is the measure of the heat liberated by the weighed sample of fuel.

Bombiccite.—A transparent, colorless mineral, found in lignite in Tuscany; it fuses at 75°C., volatizes at a higher temperature, and is soluble in carbon disulphide, alcohol and ether.

Bond.—The combined action of inertia, friction, and of the forces of adhesion and cohesion, which aids the separate parts composing a pavement to resist separation under stress. Mechanical bond is the bond produced almost wholly in a well built, broken-stone macadam road, by the interlocking of angular fragments of stone and the subsequent filling of the remaining interstices with the finer particles. The attachment of one surface to another by cement or frictional means.

Mechanical bond in a stone macadam road is performed by the interlacing of the dry stones. Cementitious bond is due to increased adherance of cement or bituminous matter incorporated with the stone.

Bone Black.—The black carbonaceous substance into which bones are converted by calcination in closed vessels; also called animal black, or charcoal.

Boomer.—A combination device used to tighten a chain or line about a loaded truck or wagon to hold it in place while transported over rough roads.

Boot Jack.—A fishing tool.

Bootleg Packer.—When it is impractical to set a string of casing to shut off water between the lowest upper water sand and the first oil sand, but necessary to run tubing through this open hole to the oil sand, it has been a practice although not recommended to make an upturned truncated cone out of canvas or leather with the small end the size of the outside of the tubing. This end is wired to the tubing with the large end of the cone turned upward in the well, and material caving off of the walls of the open hole above it will form a packer.

Bore.—To make a hole or perforation with a boring instrument; to cut a circular hole by rotary motion of a tool, as to bore for water, oil, etc.; a hole made by boring. The diameter of an engine piston or the inside diameter of the cylinder bore.

Bore-Hole.—A hole made with a drill, auger or other tools for exploring strata in search of minerals, for water supply, for blasting purposes for proving the position of old workings, faults, and letting off accumulations of gas or of water.

Boring Bar.—A revolving or stationary bar carrying one or more cutters or drills for boring; a bar of steel fitted with an automatic feed screw, cutter head and means of support for the purpose of boring engine or compressor cylinders; a portable machine for boring cylinders, driven either by power or by manual labor.

Boring Journal.—A book which contains an accurate record of the progress of the boring work, day by day. See Log.

Bottom Hole Packer.—A type of packer used at the bottom of the casing.

Bottom Settlings.—(B.S.) Sediment, earthy matter, inert organic matter or emulsion which accumulates when crude petroleum is stored in tanks. In the case of paraffin-base petroleum, the emulsion term "B.S." consists usually of amorphous paraffin wax and water; and in the case of asphalt-base or mixed crude, the emulsion is generally a mixture of approximately equal parts of oil and water.

Bottom Sheets.—The steel plates forming the bottom of an oil still.

Bottom Steam.—The steam admitted to the bottom of a still to prevent overheating and decomposition of the heavier components, or to increase the yield of light hydrocarbons.

Bottom Water.—In oil wells water that lies below the productive sand.

Bottoms.—The residue remaining at the bottom of a still after the distillation.

Boulevard Gas Fluid (Gasoline).—Highest gasoline of 76° Be. used for street lamps.

Box (Condenser).—A box in which the petroleum distillate vapors are condensed.

Box (Look).—A small glass covered case placed over the ends of the pipes coming from the stills through which the character of the distillate may be observed.

Box (Quarter).—A form of takeup used on the bearings of large engines or with large shafts. The bearing liner is divided into four parts, each of which can be adjusted independently to take up wear or for the alignment of the shaft.

Box (Stuffing).—A means of preventing leakage around a polish rod or valve stem, the point at which the rod stem passes through the partition being provided with a small annular cavity which is packed tight with some fibrous material which clings tightly to the moving rod stem.

Bradenhead.—An iron or steel head screwed to the top of an oil well casing and bored for a sliding fit with the inner pipe through which the oil flows out of the well. The joint between the Bradenhead and inner pipe is packed with some pliable substance so that there may be relative movement without leakage. The Bradenhead, which is really a cap for the casing and is tapped for a pipe through which the gas is removed.

Bradenhead Gas.—In oil wells, natural gas inclosed or confined by a Bradenhead. It applies to all the gas that lies above the oil and through which the drill must go to reach the lower and more profitable oil sands.

Brake or Actual Horsepower.—The power developed by an engine, as measured at the crank shaft of flywheel by the Prony brake, or other device.

Branchite.—A mineral from the brown coal of Mt. Vaso in Tuscany; it is colorless, has a specific gravity of 1.044, and is soluble in alcohol.

Brass.—A term often used for the brass or bronze liner of a bearing. An alloy of copper, tin and zinc.

Brea.—Soil impregnated with the heavier substances left from evaporation of petroleum seeps.

Break.—A fault; rupture; fracture. When drilling a well it is said to be a break in the formation when the material changes for a short distance.

Break Out Block.—A block of steel made to fit the square of a drill bit to hold it with the rotary table while breaking the joint.

Break Out Tongs.—A heavy pipe wrench used to connect and disconnect drill pipes.

Breaks.—A term applied locally to small faults; also applied locally to soft layers within hard ones, such as shale-breaks; also used to

indicate any sudden change in topography as from a plain to a hilly country.

Breathing.—Heading or flowing by heads, is the usual oil field term. Many wells will accumulate oil or water in the hole until gas has been confined long enough to build up a sufficient pressure to flow the well.

Brick Oil.—One grade is a pale non-viscous oil, or light bodied lubricating oil, possessing a gravity of 34° Be., a flash-point of 340°F., a fire test of 400°F., and a cold test of 20°F., and a viscosity of 80 Saybolt. The product described under paint oil is also known as brick oil. Non-viscous oil, flash point 340°F., viscosity about 80 at 70°F. (Paint oil).

Bridle Irons.—This term was introduced into the oil industry by the early rig builders, who used it formerly in connection with a flat strip of iron bent to support a timber. As used and the purpose of the bridle irons is to hold the cap on the jack post boxes down or against the upward movement created by drilling or pumping a well.

Briggs Standard.—A list of pipe sizes, thickness, threads, etc., compiled by Robert Briggs about 1862 and subsequently adopted as a standard.

Brimstone.—Brimstone is a corruption of brennisteinn, or burning stone and takes its name from the fact that sulphur has the general appearance of stone but will burn. It was first collected from deposits around volcanoes, where it solidifies as a hard substance, and in this way differs from the sulphur deposits found around hot springs.

Brine.—Water strongly impregnated with salt; salt contained in petroleum strata.

Briqueting.—A process by which coal dust is bound with asphalt, in briquets and thus made readily available for commercial use.

British Thermal Unit (B. T. U.)—The 1/180 quantity of heat required to raise the temperature of one pound of water from 32° to 212°F.; as the specific heat of water does not change much at ordinary temperatures, the B. T. U. may be taken as the amount of heat required to raise one pound of water one degree Fahrenheit. The mechanical equivalent of the British thermal unit (B. T. U.) is 778 foot-pounds, or 1 B. T. U. equals 778 foot-pounds.

Bromine Test.—A test used to determine the source of kerosene or the source of the crude from which it was made. The color given to the kerosene by adding a few drops of bromine, or the rate of decolorization gives an index to the origin of the oil. Bromine is absorbed by unsaturated hydrocarbons, the rate of bromine absorption points out the characteristics of the crude.

Brown Gasoline.—When a benzine with a high sulphur content is being treated for the removal of sulphur and other undesirable contents (or with low grade petroleum), the distillate is treated with sulphuric acid in an agitator and air is blown through the mixture to give intimate contact between the acid and benzine.

Brown Petroleum.—A natural solid or semi-solid product produced by the action of air upon fluid bitumens.

Brunton.—A combination compass, clinometer, and transit, of pocket size named for its inventor.

B. S.—A term applied to crude oil tank residue. See: bottom settlings.

B. T. U.—An abbreviation for British Thermal Unit.

Bubble Tower.—A closed cylindrical tower arranged with shelves which retain a portion of absorbing oil through which distilled gas is caused to bubble, thus the heavier fractions of gas are separated from the lighter.

Bucaramangite.—A resin resembling amber in color, but insoluble in alcohol and yielding no succinic acid.

Buffing Oil.—A 31° Be. viscous neutral oil is said to be satisfactory in buffing.

Bulk Boat.—Among primitive practices was that of transporting crude petroleum down Oil Creek to the Allegheny River in an open flat boat, called a bulk boat because it carried the oil in bulk, untrammeled by barrel, can or other container. First the oil ran from the well in a rough V shaped board trough to a crude tank, a hole in the ground 8 or 10 feet deep and 8 to 12 feet in diameter, lined with pine planks. The top of the tank was even with the surface of the ground. When a pond freshet came, the oil was pumped through a wooden pipe to the bulk boat and started on its way.

Bull.—The prefix bull found in names of numerous oil field devices might be traced back by philologists to Middle English and German dialect words which meant to make a loud noise, bellow, roar. Its significance in oil field parlance, however, is seen in the modern use of the word bull to indicate great strength and endurance as exemplified in the farm animal which is supposed to harbor a peculiar distaste for red. When the prefix bull appears in the name equipment usually is characterized is bull-like. Bull-wheel, bull-rope and bull-pump are among such names.

Bulldog Spear.—A bullet shaped piece of steel employed for fishing drill pipe or well casing. The sharp corrogations of a sliding wedge hangs onto the inside of the pipe like the grip of a bulldog. A casing spear.

Bull's Eye Level.—A level, the inner upper surface of whose bubble-container is ground to a sphere of large radiums.

Bull Plugs.—Plugs which are screwed into the end of an unfinished pipe-line to keep out dirt and small animals; made of a short pipe nipple having one end welded closed or pressed in oval form and the other end threaded, used for closing any opening in a pipe connection or threaded outlet.

Bull Pump.—A direct single-acting pump, the steam cylinder of which is placed over the top of a shaft or slope, and the piston rod attached to the pump rods. The steam lifts piston and pump rods and the weight of these produces the down stroke.

Bullrope.—Bullrope originally was a nautical word designating a hawser let through a block on the bowsprit end to the buoy to keep the buoy clear of the stern. It is wholly likely that early oil operators requiring heavy rope went to a ship chandler and bought some

of this bullrope, and that when manufactured of heavy rope specifically for oilfield use was applied to it. It is easy to see how the prefix bull then was joined to the word wheel to make bullwheel the big shaft or spool upon which the bullrope is wound; a large rope made endless by means of splicing or fastening the ends together, and used to drive from the tug rim the bull-wheel.

Bull Wheel.—A winding drum with a wheel about 8 ft. in diameter, on either end. One wheel is provided with a broad steel band applied as a brake, the other has a grooved face provided for the bull rope which drives it. The drilling cable winds upon it to hoist the tools.

Bumped Heads.—Convex or concave heads used with boilers or tanks. Sometimes known as "Dished Heads."

Bumper.—A device used to loosen the tools when drilling is carried on without jars.

Bumping.—A refinery colloquialism applied to the violent boiling of a water containing petroleum product. It usually ceases before the water is entirely evaporated.

Bunsen Burner.—A gas burner consisting of a short tube set in vertical position with both ends open. At the lower end a jet of gas is introduced and air is drawn in and mixed with the gas, thus delivering a combustible mixture at the other end where combustion takes place.

Burell-Orsat Apparatus.—A device used for the analysis of gases and gaseous products of combustion such as the gases from boilers or exhaust from gas engines.

Burmite.—A fossil resin, resembling amber, but harder and tougher; it is found in upper Burma.

Burner.—See: Bunsin, gas, oil and other types under the name that signifies the type.

Burning.—The process of combustion in which the chemical combination of oxygen with the fuel produces heat.

Burning Oils.—Illuminating oils such as kerosene, seal oil, signal oil, etc.

Burning Point.—The temperature at which oil continues to burn after ignition, the test taking place under standard conditions. This is also called the "Fire Test."

Burning Test.—See: Burning point.

Burnt Bearing.—A bearing which has become over-heated and melted out.

Bursting of Oil Barrels.—It is the custom not to fill oil barrels completely owing to the fact that in summer petroleum expands considerably, and loss may occur in this way, whilst in winter the frost may cause the barrels to burst and the contents to be lost along with the containing vessel.

Burton Process.—A cracking process for increasing the yield of gasoline from crude.

Bushing.—A pipe fitting used for connecting a pipe with a fitting of larger size, being a hollow plug with external and internal threads to suit different diameters.

Butane.—A light hydrocarbon paraffin compound (C_4H_{10}) existing in petroleum and natural gas.

Butanol.—Same as Butyl alcohol.

Butt and Strapped Joint.—A joint where the ends of two pieces of pipe are united by a sleeve and riveted thereto. The strap may be inside or outside and may be single or double riveted. More commonly used in boiler and tank construction when two sheets butted together are covered by another narrow sheet called a strap and the same riveted to the two sheets.

Butts Well (No. 1).—Name of the first gushing well ever struck in the Bradford oil field, Pa., U. S. A. in 1874. It was sunk on the Archy Buchanan farm by the Foster Oil Company and yielded a daily production of 70 barrels.

Buttweld.—Welded along a seam that is not scarfed or lapped. Two pieces of steel either rods or sheets may be butted together as so welded.

Butyl Alcohol.—C_4H_9OH Butanol. A colorless liquid slightly soluble in water and miscible with alcohol and ether.

Butylene.—A light hydrocarbon of the olefine series (C_4H_8).

Butyrelite.—A white or yellow waxy substance found in certain of the Irish and Scotch bogs. It has been described as a mineral, but is of undoubted animal derivation.

Byerite.—A caking bituminous coal from Middle Park, Colo., and resembling albertite in the large amount of gas and oil which it yields upon distillation, but is heavier (1.323) and is insoluble in carbon disulphide.

Byerlyte.—The name given by F. X. Byerley to the product obtained by his patented process United States Patent 524,130, Aug. 7, 1894, of manufacturing asphaltic substances from petroleum by the prolonged exposure to high temperature and the action of air.

By Heads.—Term used when a well flows intermittently.

By-Pass Valve.—A small pilot valve used in connection with a larger valve to equalize the pressure on both sides of the disk of the larger valve before the larger valve is opened.

C

Cable.—A fiber cable consists of three hawsers laid up left-handed. A steel rope for hoisting or for aerial trams is composed of many steel wires in groups first twisted into strands and then into a completed cable (or wire line). See: Wire Lines.

Cable System.—A system of drilling sometimes designated as the American System. The drilling is performed by a heavy string of tools suspended from a walking beam by a Manila cable or a steel wire cable (line). Reciprocating motion is imparted to the walking beam by a crank attached to the beam at the end opposite that which is over the well. Thus, the drill bit is caused to strike upon the bottom of the hole and thus drilling is performed by impact. The early method of drilling with a spring pole was the cable method on a small scale and when a cable was used.

Cable Tools.—The tools used in drilling deep holes with a rope. The tools originally employed in drilling all the smaller wells of the early fields are still employed extensively. See: Cable System.

Cables.—Ropes employed for oil-well drilling are from 2 to 2½ inches in diameter, and usually made of fine grade manila hemp.

Cage.—A structure of elastic iron rods slipped into the bore hole in rod boring to prevent vibration of the rods. The container for the ball in a ball valve such as found in the pump ordinarily used in oil production.

Calcine.—To burn to ash, to roast, or to oxidize to solid oxide.

Calcium.—(Ca.) A metallic element of a slivery white color. It belongs to the alkaline earth group.

Calcium Carbide.—(CaC_2). A solid much resembling limestone and made artificially by uniting carbon and calcium in the electric furnace. It is used for generating acetylene gas.

Calcium Carbonate.—($CaCO_3$). Contained in chalk and limestone.

Calcium Chloride.—($CaCl_2$). Used for absorbing water vapor from gases (Drying), and in anti-freezing mixtures for gasoline engine radiators.

Calcium Hydroxide.—($Ca(OH)_2$). A white powder of which slacked lime is an example.

Calf Wheel.—A short hoisting drum with a large diameter driving sprocket generally driven by a chain belt from the band wheel shaft. Its purpose is to wind up the casing line which is reeved through the sheaves of the crown block and thus supports the traveling block, which in turn supports the casing as it is lowered into the well.

Calorie.—The metric unit of heat quantity. It is the heat required to raise water 1 kilogram (or 1 gram according to conditions) one degree Centrigrade, or from 0°C. to 1°C.

Calorific Valve.—The heat liberated by the combustion of unit weight of fuel is called calorific value of the fuel. The calorific value of fuel oil lies between 18,000 and 19,000 B. T. U.'s per pound. The quantity of heat contained in a unit weight of a fuel.

Calorimeter.—Any apparatus for measuring the quantity of heat generated in a body or emitted by it, as by observing the quantity of a solid liquefied, or of a liquid vaporized or the amount of heat absorbed by a certain quantity of water, under given conditions.

Calorimeter (Mahler Bomb).—This instrument contains a pear-shaped steel bomb in which the fuel is placed together with the oxygen required for its combustion. It is immersed in a weighed jar of water, and the temperature rise of the water after ignition makes it possible to compute the amount of heat in the fuel.

Calorimeter (Parr).—Is somewhat similar to the Mahler Bomb above, but uses sodium peroxide or similar oxygen producing salt instead of gaseous oxygen.

Calorimeter (Throttling).—A device for determining the percentage of water in steam, the evaporation of the water produced by a given amount of wire drawing or throttling being measured.

Calorize.—To protect iron or steel from high temperature by coating the surface with a ferro-aluminum alloy.

Calyx.—A long cylindrical vessel of the same diameter as the core-barrel, which guides the bit, and receives the debris resulting from the action of the cutter. Its action is not unlike that of the diamond drill and necessitates the use of a powerful water flush. The cutter, which takes the place of the diamond crown, has a number of long teeth which produce a chipping action when rotated by hollow drill pipe in the presence of a constant flow of water. Used in a system of oil-well drilling, originating in Australia.

Cam.—A projecting or irregularly formed part of a machine designed to rotate and to impart an alternating motion to another part.

Canadian Pole System.—A system of oil-well drilling differing from the American cable system, in that wooden rods screwed together are used instead of a rope. The Canadian pole is a useful all round prospecting rig, and is particularly suitable for regions where excessive caving makes it necessary to have some positive method of rotating the bit.

Canadol.—A light petroleum ether (light ligroin) of the specific gravity 0.650 - 0.7000 which has been used for the production of local anesthesia by spraying and as a solvent.

Candle Power.—The illuminating value of a standard candle placed one foot from the plane of observation.

Cannel Coal.—A massive non-coking tough clean block coal of fine even compact grain dull luster and commonly conchoidal cross fracture having a typical low fuel ratio, a high percentage of hydrogen, easy ignition, long yellow flame, black solidification and partial distillation or oxidization of water laid deposits consisting of, or containing large quantities of plant spores and pollen grains and more or less comminuted remains of low orders of water plants and animals. They may be admixed greater or less quantities of mud, woody or peaty material.

Cant.—A segment of the bull wheel.

Cant Hook.—This is evidently a nautical term introduced into the petroleum and lumber industries by seafaring men for can't; as used

at sea means a sudden thrust or push producing a bias or change of direction or position. The cant hook is used for this purpose in moving heavy timbers and rolling and placing pieces of machinery.

Cap.—A fitting that goes over the end of a pipe to close it producing a dead end.

Cap Rock.—A comparatively impervious stratum immediately overlying an oil-bearing rock.

Capillarity.—The peculiar action by which the surface of a liquid, where it is in contact with a solid (as capillary tube) is elevated or depressed.

Capillary Attraction.—The effect of skin tension and absorption in making a fluid creep or crawl along a surface. When the absorption or attraction of a liquid for a solid surface is greater than the attraction between its own molecules, then the fluid will be forced along by the difference in skin tension.

Capillary Feed.—Bearings in which the lubricating oil is supplied by a wick.

Capillary Tubes.—Glass tubes of very small diameter used to obtain a distinct capillary effect and to cause a rise of fluid in the tubes of considerable magnitude.

Capillary Viscosimeter.—A type of viscosimeter or instrument for measuring the viscosity of oil, in which advantage is taken of the relations existing between viscosity and capillarity.

Capping.—The name given to a method by which the flow of a spouting oil well is stopped or restricted. When a very strong discharge of petroleum is expected, strong valves are attached to the casing, which permit the flow to be controlled, and in order to prevent these valves from being blown away, they are firmly anchored to the ground by means of long, heavy bolts. Shutting off a well so as to prevent the production of oil and gas.

Capstan Winch.—A vertical winch head used to wind up the anchor or to pull heavy loads aboard ship. Some times used in oil industry.

Car Oil.—Black lubricating oils designated as low cold-test, black oil, etc. Car oils are usually black lubricating oils of the same general character as summer black oil. Lubricants for car axles must be cheap, and some railroad specifications require a gravity of 29° Be. of 5° to 15°F.

Carbenes.—Those constituents of bitumens which are soluble in carbon bisulphide, but insoluble in carbon tetrachloride.

Carbide.—A binary compound of carbon such as calcium carbide. This term is often popularly applied to Calcium Carbide.

Carbolic Oil.—Consists largely of naphthalene and phenol, together with pyridine and cresol. It is an oil obtained by the distillation of coal tar.

Carbon.—(C). A non-metallic elementary solid existing in three different physical forms: A black hard solid as in coke and charcoal; as a soft, flaky and greasy solid such as graphite; in white crystalline form as in the diamond. The element carbon is the base of all hy-

drocarbons and is capable of combining with hydrogen in almost any proportion, this property resulting in almost numberless hydrocarbon compounds. Carbon is the base of all present time commercial fuels, existing in some form in coal, petroleum and wood.

Carbon Black.—A name for lampblack.

Carbon Dioxide.—(CO_2). A colorless, odorless gas formed by the complete combustion of carbon. It is incombustible since this gas is the lowest form to which carbon can be burned. Any fuel, properly burned and containing carbon, produces carbon dioxide. It is not poisonous, but will suffocate by displacing the pure air. The percentage of carbon dioxide in the exhaust gases of an internal combustion engine, or in the smoke stack gases of a furnace, is indicative of the thoroughness of the combustion.

Carbon Dioxide Refrigeration.—A refrigerating system in which carbon dioxide gas is used as the transfer medium. The gas is compressed in a CARBON DIOXIDE COMPRESSOR until it liquefies, and this liquid is then led to the point where cooling is desired and is expanded through a valve to a lower pressure. During expansion the liquid changes back into gaseous form and in so doing absorbs large quantities of heat from surrounding objects. This gas is again compressed and again passed through the expansion valve in a continuous circuit.

Carbon Disulphide.—(CS_2). A highly refractive colorless liquid having an intensely disagreeable smell, much like rotten eggs. It is principally used as a solvent for carbon compounds. It is volatile and inflammable.

Carbon Electrodes.—In an arc type electric furnace large carbon bars are used, the ends of the bars being slightly separated so that an electric arc or flame is established between the two. This gives an intensely hot flame adapted to metallurgical operations. The carbon plates used in some electrolytic operations, the two plates being immersed in a fluid serve as a means of passing a reducing current through the solution for the separation of various elements dissolved. Carbon used as battery electrodes, brushes, electric furnace electrodes, arc lamp carbons, etc.

Carbon (Fixed).—Solid carbon in a compound which cannot be distilled. The solid carbon in coal which remains in "coke" after the more volatile hydrocarbons are driven off by heating in closed vessels. The carbon in the heavy residues left after the distillation of crude petroleum.

Carbon Freezing.—The production of low temperatures by means of the rapid evaporation of carbon dioxide or carbon dioxide snow.

Carbon Knock.—A knock or pounding in a gage or gasoline engine by incandescent carbon deposits in the cylinders. The heated carbon causes the fuel to detonate or explode and also causes "Preignition" or ignites the fuel before the end of the compression stroke.

Carbons (Lighting).—The carbon rods used in electric arc lights, between which the electric arc or spark is maintained.

Carbon Monoxide.—(CO). A colorless, poisonous gas resulting from the incomplete combustion of carbon when burned with an insufficient air or oxygen. This gas is inflammable and can be further

burned to carbon dioxide. The existence of large volumes of carbon monoxide in exhaust gases or chimney gases indicates imperfect combustion and an insufficient supply or distribution of air. It always exists to some extent in practice, but an excess should be avoided.

Carbon Test (Color).—An approximation to determine the carbon content by the comparison of the color of a fluid with the color of a standard solution. This is quicker than the combustion method.

Carbon Test (Combustion Method).—A burning test made to determine the total amount of carbon in a compound or in mechanical solution.

Carbon Test (Conradson).—A means of determining the solid residual carbon in petroleum distillates principally in lubricating oils. This method is practically standard in the United States.

Carbon Tetrachloride.—(CCl_4). A solvent fluid non-inflammable having a powerful, pungent odor. Also used for fire extinguishers.

Carbonate.—To impregnate with carbon dioxide. Thus carbonated water is water in which large volumes of carbon are dissolved. A compound formed by carbon dioxide.

Carboniferous.—In the nomenclature of the U. S. Geological Survey, and in general usage as well as the youngest of the systems into which the Paleozoic stratified rocks are divided; also the corresponding period of geological time.

Carbonite.—Carbonite, or native coke, occurs at the Edgehill mines, near Richmond, Va., it is more compact than artificial coke and some varieties afford bitumen.

Carboxylic Acids.—As much as 5.25 per cent of oxygen occurs in the fraction of Caucasian petroleum boiling between 220° and 230°C.; he considers the acids to be carboxylic acids, derived from the naphthenes of the petroleum.

Carburet.—To charge a gas with carbon. To charge air with hydrocarbon vapor in such proportions that a combustible mixture is formed. Thus the carbureted mixture used in gasoline engines is produced by charging air with gasoline vapor.

Carbureted Hydrogen.—Any of several gaseous compounds of carbon and hydrogen, some of which are the constituents of an illuminating gas. Light carbureted hydrogen is methane or marsh gas, CH_4. It is the chief constituent of fire-damp.

Carbureted Water Gas.—The water gas produced by passing steam through incandescent coal is afterwards given charge of oil vapor to increase the luminosity.

Carbureter.—A device used on a gasoline engine (and a few kerosene engines) for carbureting air with gasoline vapor.

Carbureter (Jet Type).—A carbureter in which the gasoline is sprayed into the mixing chamber through a jet or nozzle.

Carbureter (Surface Type).—A carbureter (oil type) in which the air is passed over the surface of the gasoline or bubbled over the surface of the gasoline, or bubbled up through it, the evaporation providing the vapor. Another form consists of a series of cotton wicks dipping in the fluid, the wicks extending the evaporating surface.

Carcel Lamp.—A French standard lamp for measuring candle power. This lamp burns colza oil.

Carnot Cycle.—An ideal cycle of expansion and compression in a heat engine, a perfect gas being assumed (Theoretical proportion). The cycle consists of two isothermal and two adiabatics. The availibility of heat energy for transformation into mechanical energy is given by the efficiency of the Carnot cycle.

Case Hardening Bath.—A bath generally containing molten potassium cyanide, the steel parts being dipped in the cyanide for carbonization.

Case Hardening Furnace.—A form of furnace in which the steel is heated in contact with carbonaceous matter so as to form a hardened high carbon skin over the still parts.

Casing.—Generally of cylindrical form, in diameter riveted or screwed together and lowered into a hole during the progress of drilling to support the sides of the well to prevent the ground from caving in, and to shut off water, gas or other fluid from entering the well. A steel pipe placed in a well.

Casing Anchor Packer.—A type of packer which can be anchored within the casing.

Casing Clamps.—Two heavy steel bars (about 1½" x 12" and several feet long in some cases) formed so that each is nearly a semicircle with ends projecting. The two bolted about a casing rest upon a foundation and form a support for the casing.

Casing Dog.—The word dog apparently was introduced into the English language to describe a powerful breed of hounds, and this word has been used in combination with others to describe various mechanical devices usually consisting of a tooth or claw used for gripping or holding. Thus, casing dog is a gripping device for holding casing; a gripping device using a sliding wedge with sharp teeth-like surface.

Casing Elevator.—A circular clamp made in halves hinged at one side and made fast with a latch at the other. It has two long heavy links that furnish means for hanging it upon the hook of the traveling block, or the casing hook, used to elevate and lower casing.

Casing Fitting.—A fitting threaded with casing thread.

Casing Float.—A check valve placed in a string of casing generally near the lower end while same is being lowered to place in a well.

Casinghead.—A fitting screwed to the top of a well casing. It is provided with side outlets for gas or oil, and means for supporting the tubing generally used in pumping special designs are sometimes used depending upon the circumstances.

Casinghead Gas.—Natural gas rich in oil vapors. So named as it usually is collected or separated from the oil at the casing head. Frequently called Combination Gas or Wet Gas. This gas used in the making of gasoline by absorption or compression process. In absorption the gas is passed through shower of mineral seal oil of 35° Be. It absorbs gasoline, is taken to still and heated, gasoline given off and condensed. In Compression pressures ranging from 50

pounds to 250 pounds applied passed through cooling tower and gasoline condensed out of gas.

Casinghead Gasoline.—The liquid hydrocarbon extracted from casinghead gas by one of the three methods. Compression, absorption or refrigeration. See: Natural Gasoline.

Casing Hook.—A heavy hook, usually attached to the traveling pulley block, which engages the links of the casing elevator.

Casing Knife.—A tool for cutting off casing in the hole.

Casing Line.—The steel wire line that is used to hoist and lower casing.

Casing Pressure.—The pressure built up between the casing and tubing when the casing and tubing are packed off at the top of the well. It is usually measured by placing a pressure gage on one of the side outlets on the casing head.

Casing Ripper.—A tool containing expanding cutters which can be lowered into well on a cable or suitable steel line, and which is designed to rip longitudinal slits in the casing for the purpose of releasing the casing at a coupling, or to perforate the same allowing oils or gas to enter.

Casing Shoe.—A circular steel device having a cutting edge, fixed to the bottom of a string of casing to straighten it, and to help in forming a tight joint with either the cement or the hard rock upon which the casing is set. The modern use of cement has reduced the importance of the shut-off qualities formerly supposed to be possessed by the casing shoe.

Casing Spear.—A fishing tool designed to be lowered into a well for the purpose of recovering lost casing. It enters the open end of casing as it is lowered, but grips the casing when elevated. Also called "Bull Dog Spear." It will not let go when once made fast.

Casing Spider.—A heavy steel piece with a large cone shaped hole through it provided with slips to hold casing suspended.

Casing Substitute.—A connection used in fishing with the rotary.

Casing Tester.—A device used to determine the location of a leak in casing.

Cast.—The flourescence or bloom of an oil. The colors of surface reflection seen in most heavy petroleum oils.

Castor Machine Oil.—An oil much used for lubrication of axles, journals and harvesters, usually supplied in three grades. It is the solution of an aluminum soap in paraffin or light neutral oil.

Castor Oil.—A vegetable lubricating oil obtained from the castor bean. It is very heavy and viscous and is used for extremely heavy service, or under severe heating conditions as in the cylinders of rotary air cooled aeronautic engines. Especially efficient in lubricating bearings that are heavily loaded. It will cool a hot bearing when other oils may fail.

Castrol.—The trade name of an English brand of castor aviation oil.

Catalytic.—An agent employed in catalysis, as platinum black, aluminum chloride, etc.

Catalysis.—A chemical reaction taking place due to the contact of a substance known as "Catalytic Agent" the catalytic agent undergoing little or no chemical change during the process. Thus, a cool hydrocarbon gas will not ordinarily take fire on making contact with the air, but if platinum black is placed in the gas stream, the atmospheric oxygen will immediately combine with the carbon and ignite. The catalytic in this case is the platinum, and it undergoes little or no change in the ignition process. The presence of such salts as aluminum chloride in petroleum during distillation is said to affect the quality of the distillates, but remain practically unaffected themselves.

Catch All.—A tool for extracting broken implements from drilling wells.

Cat Head.—A winch on the countershaft of the draw works. It is used to wind a line when breaking or making up a tool joint. Also in pulling tongs to screw up casing. This term evidently is derived from the nautical term cat-beam which refers to a beam that projects almost horizontally at each side of the bows of a ship and is used for raising the anchor from the surface of the water to the deck without touching the bows and for carrying the anchor on its stock-end when suspended outside the ship's side.

Cathode.—A negative pole of an electric circuit.

Caustic.—Corrosive, capable of eating away or destroying matter. Especially applied to the destructive action of powerful alkalis such as the hydroxides.

Caustic Lime (Quick Lime) Co. (OH_2).—Calcium hydroxide.

Caustic Potash (Lye). (KOH).—Potassium Hydroxide.

Caustic Soda (NaOH).—Sodium hydroxide (hydrate).

Causticity.—An excess of lime in boiler feed water compounds. The measure of caustic action.

CC.—Abbreviation for cubic centimeters.

Cedarite.—A fossil resin resembling amber, somewhat widely distributed of an alluvium of the Saskatchewan River in Canada.

Ceiling.—The maximum height to which an aeroplane can ascend.

Cellar.—An excavation made when preparing a well for drilling, 8 ft. by 8 ft. by 10 ft. deep, or larger on deeper wells.

Cellulose.—The woody fiber of plants. Any material made from the fiber of plants takes its name from Cellu, such as celluloid, Cellulose, acetate, etc.

Celsius.—A thermometer scale on which the Centigrade temperature system is based.

Cement.—An adhesive substance used for uniting particles or other materials to each other. Ordinarily applied only to calcined "Cement rock", or to artificially prepared, calcined, and ground mixtures of

limestone and silicious materials. Sometimes used to designate bituminous binder used in bituminous pavements when the expression "bituminous cement" is understood to be meant.

Cement Valve.—Cement Shoe.—See: Casing float and float valve.

Cementation.—A process of causing a chemical change in a substance by heating while embedded in a powdered mass of another substance, etc. The process by which sediments or sands are consolidated into hard rock. Used in oil well practice.

Cementing.—The construction of a barrier between the exterior of the lower portion of the casing and the wall of a well, in order to exclude all water.

Center Irons.—The iron or steel parts which make up the shaft on which the walking beam moves.

Centergrade.—Consisting of a hundred divisions. The centigrade thermometer has zero 0°, as the freezing point of water and 100° as its boiling point.

Centigram.—A weight equal to one hundredth part of a gram or 0.15432 of a grain.

Centipoise.—The one-hundredth part of Poise, an absolute unit of fluid viscosity.

Centrifugal Force.—A force developed by the rotation of a body which tends to throw the body away from the center of rotation. Acts tangent to circle of travel.

Centrifugal Governor.—A speed regulating device used on engines by which the speed of rotation affects the altitude of two rotating balls or weights, any variation in speed causing the balls to assume a new plane of rotation and at the same time to cut off or increase the flow of steam, gas, or oil.

Centrifuge.—A laboratory device used to perform a quick separation of substance of different gravity by rapid rotation. The samples are placed in a small graduated bottle, and are then rapidly whirled on the centrifuge. The heavier component is thrown to the bottom and the percentage can be read from the graduations on the side of the centrifuge bottles. An instrument for separating liquids of different specific gravities by use of centrifugal force.

Centrifuge Stock.—This name is obtained from the rapid centrifugal method of separation. The wax obtained from the process is of somewhat higher melting point than that obtained simply by cold settling.

Centroclinical.—An uplift of strata which gives them a partial quaquaversal dip.

Ceresin.—Ceresin is prepared by heating ozokerite with sulphuric acid, with constant stirring and decolorizing with charcoal; the product is then treated with volatile solvent to extract the contained product ceresin. Ceresin is used as a substitute for beeswax. It occurs in commerce in the form of thin round masses several inches in diameter harder than wax of a dazzling white appearance; inodorous, and transparent at the edges. The melting point is between 75° and 80° C.

Ceresine.—A mineral wax made from purified ozokerite.

C. G.—Abbreviation for center of gravity.

C. G. S.—A metric system of units involving basic measurements. The letters are abbreviations for CENTIMETER, GRAM, SECOND, system. The unit of length is the centimeter, the unit of weight is the gram, and the unit of time is the second. This system is extensively used in scientific work.

Cetene.—A hydrocarbon found in American petroleum.

Chain.—Short links of steel or other metal, one attached to the next in series form a chain.

Chain Belt.—Flat links built into a chain for the transmission of power.

Chain Compounds.—Hydrocarbon compounds in which the hydrogen and carbon atoms are bound together in "Chain" form, that is, the hydrogen atoms are linked to the carbon atoms in straight lines. Examples of chain compounds are the paraffine hydrocarbons such as methane, ethane and propane.

Chain Tongs.—A pipe-fitter's tool; a level with a serrated end provided with a chain to embrace the pipe.

Chalk Rock.—Drillers' term for soft white limestone.

Chapapate. (Cuba).—A kind of asphalt or bitumen also called Mexican asphalt.

Chapopote or Chapapote (Mex.).—Mineral pitch; asphaltum.

Charcoal.—Impure solid carbon formed by highly heating wood (charring) in the absence of air. Animal charcoal is formed by charring bones (bone black). The wood charcoal is used as a fuel in making some grades of pig iron and as a filtering medium for purifying liquids. Animal Charcoal of "Bone Black" is used as a pigment in paints, and also as a filtering medium in filtering oil.

Chats.—Small stones used in paving. Coarse sand and mixed fossils found in some oil wells.

Check Valve.—An automatic non-return valve; or a valve which permits a fluid to pass in one direction, but automatically closes when the fluid attempts to pass in the opposite direction.

Checker Boarding.—The division of property in such a way that two parties take alternating parcels of land.

Cheese Box.—A name given to a vertical cylindrical still, used in the distillation of petroleum.

Cheese (Paraffine).—The paraffine from the press which is saturated with oil.

Chemawinite.—A resin related to succinite occurring on a beach on Cedar Lake, near the mouth of the north Saskatchewan; it has a specific gravity of 1.055, its color varies from pale yellow to dark brown, and it is soluble to the extent of 21 per cent in absolute alcohol.

Chemical Affinity.—The tendency of one substance to enter a chemical combination with another substance.

Chemism.—The measure of a tendency toward the combination of two elements or compounds. Thus the chemism of sulphuric acid in regard to the metal sodium is greater than that of chloride, for sulphuric acid will form sodium sulphate from sodium chloride, the sulphuric acid driving out the hydrochloric acid in so doing.

Cherry Coal.—The cherry coal, or soft coal of England is a non-caking coal which ignites well and burns rapidly.

Cherry Picker.—This designation is applied to a fishing tool which is a modified form of the horn socket. The lower end, or mouth is cut away on one side so that it resembles a scoop. Sometimes, instead of the scoop effect, the socket contains a running almost the entire length of the tool. By reason of its peculiar shape the device as it turns works around and back of a fish that has become partly embedded in the wall of the hole and engages it when the regular horn socket would fail. This faculty of reaching out and grasping a lost tool led to the name of cherry picker.

Chill Point.—The temperature at which flakes of wax start to form in a liquid, or the temperature at which a lubricating oil starts to congeal.

Chillers.—A piping system through which the wax distillate is run to chill the wax and thus separate it from the oil.

Chloride of Lime (Calcium Chloride).—A combination of lime and chlorine used as a disinfectant about camps and water supplies.

Chlorine (Cl.).—An elementary greenish-yellow gas. It enters into combination with nearly all metals to form chlorides or chlorates, common salt being an example of a chloride. Often used for bleaching or color removal.

Chlorination.—Treatment of a substance with chlorine gas for bleaching, clarifying or for the removal of some element. The odors of some gasolines are removed by treatment with dry chlorine gas, and it is also used as a bleaching medium with some oils.

Christmas Tree.—An assembly of valves and fittings at the head of the casing of an oil well to control the flow.

Christmatite.—A butyraceous greenish-yellow to wax yellow hydrocarbon from Wettin, Saxony; it has a specific gravity of below 1 and is soft at 55° to 60° C.

Chromium (Cr.).—An element (metallic) used in alloying steels and for various chemical processes.

Chromometer.—An instrument used to determine the color of oils according to some fixed scale. The Saybolt Chromometer is an example.

Chronometer.—An instrument for determining the color of petroleum and other oils.

Churn Drill.—Also called Cable Drill or Well Drill. A portable drilling equipment usually mounted on four wheels and driven by gasoline, electricity, or steam. Also applied to a stationary drill operated from a derrick, as in oil well drilling. The drilling tools are raised by means of a rope or cable and allowed to drop, thus striking successive blows by means of which the rock is pulverized and the hole deepened.

Circuit (Short).—A defective path or circuit (leaking circuit) in such condition that the circulating fluid or current can return to the starting point without going through all points of the circuit proper.

Circular Polorization.—A phenomenon observed in a polariscope when two-plane polarized rays, propagated in the same direction have their vibration directions at right angles to each other and differ by one-quarter of a wave-length in phase.

Circulated Gas-Oil Ratio.—The number of cubic feet of gas introduced into the well for gas-lift operations, per barrel of oil lifted.

Circulating and Splash System.—A lubricating system of the low pressure type used on automobile engines. The pump delivers the oil into a number of troughs (troughs supplied individually), the ends of the connecting rods splashing into the troughs and throwing oil on the bearings and the interior of the cylinders. The excess oil flows back into the crankcase together with the drip, and is recirculated by the pump after passing through a strainer. As the troughs are fed individually and are separate, the proper level is maintained in each trough regardless of the angle at which the engine may be standing.

Circulation.—Used to describe the passing of water or liquid down through the drill stem and up to the surface in the process of rotary drilling or in setting casing.

Clarifier.—A device for clarifying or for separating suspended solid matter from a liquid.

Claroline.—A mineral oil having a specific gravity of 0.8667 at 15° C., and a viscosity of 4.4 Engler at 20° C. Flash Point equals 150° C. It is used as a solvent or absorbent for natural gases.

Clay Revivifying System.—A method by which fuller's earth or other decolorizing clays are cleaned for re-use.

Clay Wash.—Method used to improve color or odor of an oil by agitating the oil with fuller's earth or other clay.

Cleansing Oil.—A naphtha possessing a boiling point of 120° to 150° C.

Cleavage.—A tendency to cleave or split along definite, parallel, closely spaced planes, which may be highly inclined to the bedding planes. It is a secondary structure commonly confined to bedded rocks. It is developed by at least some recrystallization of the rock. The term cleavage should not be applied to the fracturing of rocks which is jointing.

Clevis.—A "U" shaped steel piece with holes in each end through which a bolt connects, thus completing a link. Used to connect a common chain or to make fast the end of a line as in case of a traveling block.

Clinch or Clink Bolts.—Cross bolts under spear bolts to prevent the pump rods from stripping.

Clinometer.—An instrument used to measure vertical angles, such as the dip of strata or the slope of the ground.

Clip.—A "U" shaped piece with ends threaded and bar with nuts

provided to clamp over two or more pieces to bind them together. A clamp to fasten the end of a rope or wire line.

Close Nipple.—One whose length is about twice the length of a standard pipe thread and is without any shoulder; a very short nipple.

Close Return Bend.—A short cast or malleable iron, "U" shaped fitting for uniting two parallel pipes. It differs from the open return bend in having the arms joined together.

Close Sand.—Sand that is too closely grained to form a good oil reservoir.

Closed Basin.—A district draining to some depression or lake within its area, from which water escapes only by evaporation.

Closed Fold.—A fold in which the limbs have been compressed until they are parallel.

Closed Pressure.—The pressure on a gas well that has been closed long enough to attain a maximum. The time is usually about 24 hours, but is sometimes several days. The well must stay closed until the pressure does not increase more rapidly than 1 per cent in ten minutes before the pressure is gauged.

Cloth Oil.—Term given to one of the distillates of crude petroleum with a special gravity of 0.875 which is sold for oiling wool.

Cloud Test.—The temperature at which paraffine waxes or other solid substances begin to crystallize out or separate from solution when an oil is chilled under definite specified conditions. Temperature at which the oil "clouds" with flakes of paraffine when being cooled.

Cloustonite.—A mineral related to asphalt, occurring in patches in blue limestone and in blue flags at Inganess, Orkney. It is soluble in benzol and at a red heat gives 47.8 per cent of "illuminating gas."

Clutch.—A device to connect and to disconnect at well and with little or no delay the two parts of a rotating shaft or a pulley and a shaft.

Coagulant.—A substance producing coagulation. Alum, certain acids, and alcohol are examples of coagulants.

Coagulation.—Curdling or forming clots of matter in a solution; a means of separating aluminum or colloidal matter from a solution.

Coal Analysis.—The analysis of coal required for the determination of the combustible and non-combustible components as well as such destructive agents as sulphur; PROXIMATE ANALYSIS in which only the principal groups are given, Fixed Carbon, Volatile Hydrocarbons, Moisture, Ash, and Sulphur.

Coal (Ash).—Non-combustible mineral matter contained in all coals.

Coal (Cannel).—Bituminous coal rich in gases and hydrocarbons. Suitable for the manufacture of retort gas and coal tar products. Contains a large percentage of volatiles.

Coal (Coking).—Bituminous coal used for making coke for blacksmith's fires.

Coal (Du Long's Formula).—A formula for estimating the heating value of coals. B. T. U. per lb. equals.

$$\frac{1}{100} \times [14{,}544\,C + 62{,}028\left(H - \frac{O}{8}\right) + 4050S]$$

where C equals per cent of total carbon, H equals per cent of total hydrogen, O equals per cent of oxygen, and S per cent of sulphur.

Coal (Fuel, Ratio of).—The content of fixed carbon divided by the content of volatile matter is called the "Fuel Ratio." The fuel ratio of anthracite is not less than 10, that of semi-anthracite is 6-10, semi-bituminous is 3 to 6, and bituminous coals up to 3.

Coal Gas.—Gas produced by the distillation of coal in retorts or muffles. This gas has a high illuminating value, but is expensive. The distillation of coal is accompanied by such products as coal tar, benzol, ammonia, etc. Bituminous coal is used in this purpose and the final product is coke.

Coal (Mine Run).—Bituminous steam coal not graded but of mixed size as it comes from mine.

Coal Oil.—An improper name applied to American illuminating oils such as kerosene. Petroleum products have nothing to do with coal.

Coal (Pulverized).—Finely pulverized coal has been used extensively of late, the coal dust being blown into the combustion chamber after preheating. This produces a roaring flame much like a gas or oil flame and gives an intense heat. Low grade, small sized coal may be used but trouble is often experienced with the molten ash adhearing to parts of the boiler.

Coal Tar.—A mixture of hydrocarbon ring compounds (Unsaturated hydrocarbons) of the aromatic series, obtained by the distillation of bituminous coal. It is a thick, black tarry fluid containing light oils, pyridine bases, phenols, naphthalines, anthracenes, anilines, heavy oils, etc. It varies greatly in composition and may be classified principally into "Retort Gas Tar", and "Oven Gas Tar," according to the method production. The tars may be directly used as fuels or they may be further broken up by distillation into benzine (Benzol) Naphthaline, etc. Aniline oil used in dyes is an important commercial product of coal tar and is also the base of many pharmaceutical preparations.

Coal Tar Naphtha.—The light oil distilled from coal tar which corresponds to the light products of petroleum. Redistillation of the light oils results in benzine or automobile benzol, and toluol. In this country, the light oils are the distillates lighter than water, and the heavy oils are those fractions which sink in water.

Coal Tar Oils.—Oils obtained by the distillation of coal tar. Classified into light and heavy oils. A light oil is one having a specific gravity less than 1,000 and contains the coal tar naphthas. The heavy oils sink in water and contain such compounds as creosote, anthracene, anthracene oil, etc.

Coal Tar Pitch.—The residue left from the distillation of coal tar. Most of the tar is run to soft pitch, having a melting point from 60° C to 80° C, but harder pitch may be had as well.

Coalescence.—To combine or unite into one body. Thus a number of rain drops coalesce to form a larger drop.

Cock.—A device for regulating or stopping the flow in a pipe, made by a taper plug that may be rotated in a body having ports corresponding to those in the plug.

Coefficient.—A number commonly used in computation as a factor, expressing the amount of some change or effect under certain conditions as to temperature, length, time, volume, etc., as the coefficient of contraction, depression discharge, displacement efficiency etc.

Cofferdam.—A double bulkhead provided in tank steamers for the purpose of isolating the oil cargo from the engine and boiler space or from compartments used for other cargo, and to prevent leakage into the adjacent compartments. A water tight bulkhead or dam constructed of two rows of sheet piles with clay between to permit the pumping out of water for the purpose of construction work below the normal level in a river or lake.

Cohesion.—That force by which molecules of the same kind or of the same body are held together, so that the body resists being pulled to pieces.

Coil.—A number of turns of piping or series of connected pipes in rows or layers for the purpose of radiating or absorbing heat.

Coil Drag.—A tool to pick up pebbles, bits of iron, etc., from the bottom of a drill hole.

Coke.—The solid or fixed carbon obtained from carbonaceous mineral matter such as coal or carbon by the distillation of the volatile hydrocarbons. COAL COKE is obtained by distilling coal and driving off the tars and volatile matter. It is a light, brittle substance with a metallic luster and forms a hot, smokeless fire. PETROLEUM COKE is the coke formed in the still after all of the oils and tars have been driven off by distillation. It is used in making electric arc light carbons and iron moulder's facings. It usually shows the following composition: Volatile and combustible matter, 5 to 10 per cent; fixed carbon 90 to 95 per cent; ash from a trace to 0.3 per cent; sulphur from 0.5 to 1 per cent.

Coke Oven Tar.—Coal tar produced in by-product coke ovens in the manufacture of coke from bituminous coal.

Coke Scrubber.—An apparatus filled with coke moistened with oil used to purify gases.

Cold Pressing.—Chilling paraffine distillate to solidify the paraffine and then pressing it to remove the oil from the wax.

Cold Settling.—The separation, by virtue of difference in specific gravity of a petroleum product, solid at the temperature employed, from an enveloping liquid petroleum medium. In its usual application, the term refers to the separation of amorphous wax at low temperature from a naphtha solution of filtered steam refined stock.

Cold Test.—A name given to a test applied to lubricating oils in order to ascertain the temperature at which the paraffins begin to solidify.

Collar.—A term used in place of the word coupling in such connection as Kimberly Collars. Also used to mean threaded pipe coupling; sleeve in the back of certain styles of flanges, such as riveted flange is called a collar; certain styles of flanges attached by peening and beading are known as Collar Flanges.

Collar Buster.—A fishing tool used to part casing above the point at which it is frozen (sands).

Collar Clamp.—A split clamp that can be attached to a pipe collar for the purpose of stoping a leak.

Colloid.—A jelly-like or gelatinous substance, extremely small particles of gelatinous matter dispersed in a fluid; very small particles of liquid enclosed by a thin membrane or skin dispersed in a fluid. Thus, colloidal graphite is extremely fine graphite, so finely subdivided that it will remain permanently suspended in a fluid. Petroleum oils may be considered as built up of colloids, the heavier oils having a greater percentage of colloids than the lighter fractions.

Color.—The color of an oil by transmitted light or obtained by allowing the light to pass through a definite thickness of the fluid. The colors of the different petroleum oils are standardized in order to obtain uniformity of grade from a given crude, but this has but little practical value outside of a general classification. Thus we have water-white, straw, lemon, pale lemon, etc., and in some systems the various colors are given significant numbers according to a standard scale. See Standard Colors.

Color Test.—A test to determine the color of a fluid. A test to determine the composition of a fluid by comparing its color with the color of a standard solution containing a known percentage of the substance. Thus, in steel analysis a color test is made for manganese and carbon, the color of a solution containing a known percentage of either carbon or manganese.

Colorimeter.—An instrument for performing a color test or for analyzing by the color comparison method. PETROLEUM COLORIMETER consists of a device holding a sample tube of the given oil and a tube containing a standard oil or a standard colored disc. The meter is so arranged that comparison can be quickly and accurately made.

Colza Oil.—A vegetable oil some times known as Rapeseed Oil. It is used as a lubricant and as a standard illuminant in some European measurements of candle power. MINERAL COLZA OIL is a petroleum substitute for colza oil.

Combination Gas.—Natural gas rich in oil vapors. Wet gas. Also called Casinghead Gas.

Combination Rig.—A rig comprising a complete cable-tool outfit and a complete rotary outfit.

Combination Socket.—A fishing tool.

Combining Weight.—That proportional weight, referred to some standard, and for each element fixed and exact, by which an element unites with another to form a distinct compound. The combining weights are either identical with, or are some multiple or sub-multiples of, the atomic weight.

Combustible.—Capable of taking fire and burning. That part of a fuel (coal or wood) which burns or gives off heat. This includes the carbon, hydrogen and sulphur, but not the ash nor moisture. It is expressed as a percentage of the total weight of the fuel.

Combustion.—The process of burning or the chemical process of combining oxygen with a fuel to obtain heat, and sometimes light. Heat is developed by the process of combustion when oxygen enters into combination with carbon to form carbon monoxide or dioxide, and with hydrogen to form water vapor as a product of combustion. A definite amount of oxygen is required for the combustion of a fuel.

Combustion (Air of).—Weight of air required to burn one pound of combustible.

Combustion Chamber.—A space over or in front of a furnace where the gases from the fire become more thoroughly mixed and burnt.

Combustion (External).—When the fuel is burned outside of the working cylinder of a heat engine, as with the steam engine where the fuel is burned, under a boiler, the combustion is said to be external and the engine is known as an "External Combustion Engine."

Combustion (Internal).—When the fuel is burned within the working cylinder of a heat engine, as with a gasoline or gas engine, the combustion is "Internal" and the engine is an "Internal Combustion Engine."

Combustion Method.—A method for the quantitative determination of carbon, hydrogen, etc., by combustion of the substance with air, oxygen, or some solid oxidizing material, as copper oxide, and absorption or collection of gaseous product. It is extensively used for the analysis or organic compounds, and also the determination of carbon in iron and steel.

Combustion (Surface).—A method of combustion of which ignition takes place on a solid surface, or in a defined zone, the air and fuel being injected together. One example of surface combustion is the gas, where a mixture of air with gas or air with oil vapor is forced through a porous wall, and ignited on the far side after passing through. Since the air is supplied with the gas it will burn along the surface regardless of the atmospheric conditions. It will even burn under water. The flame of surface combustion is non-luminous.

Combustion Tube.—A tube capable of standing considerable heat, used in the combustion method.

Commutator.—A drum built up of insulated copper bars, each bar being connected with the armature winding of an electric dynamo or motor. It is used on continuous or direct current machines to convert the alternating current of the armature into the direct current used or supplied by the external circuit. Brushes pressing on the commutator supply the armature current to a motor or remove the current in the case of a dynamo. There is sliding contact between the brushes and commutator.

Commutator Compound.—A waxy substance, generally a compound paraffine and beeswax, used to lubricate the brushes and commutator of a dynamo or motor, and to reduce sparking and cutting.

Compass.—An instrument for determining directions, usually by the pointing of a magnetic needle free to turn a horizontal plane as, for example, the ordinary surveyor's compass. An instrument used by a mechanic or an engineer to draw circles and to lay out geometrical figures.

Composition.—An aggregate, mixture, mass or body formed by combining two or more substances. A composite substance; the chemical constitution of a rock or mineral.

Compound.—A distinct substance formed by the union of two or more ingredients in definite proportions by weight. To be distinguished from a mixture. A lubricant applied to the inside and outside of ropes, preventing corrosion and lessening abrasion of the rope when in contact with hard surfaces.

Compound Engine.—An engine in which the expansion of the steam is carried out in two cylinders, the high pressure cylinder and the low. Steam from the boiler enters the high pressure cylinder, and after a partial expansion it is exhausted into the second or low pressure cylinder where the expansion is completed.

Compound Oils.—Mineral oils which are mixed with animal or vegetable oils to increase viscosity or adhesion.

Compression (Adiabatic).—A method of compression in which heat is neither allowed to enter or leave the cylinder. The walls are considered as being perfectly insulated against loss of heat. Some exchange, however, always takes place in practice.

Compression Gasoline.—Natural gasoline made by compression system.

Compression (Isothermal).—Compression in which the air or gas is kept at a constant temperature.

Compression (Normal Polytropic).—Compression as actually carried out in an internal combustion engine or compressor. This lies between the isothermal and adiabatic methods, for as the cylinder walls are of metal and are water-jacketed, some heat either enters or leaves the cylinder during compression.

Compressor Oils.—A straight-reduced viscous neutral oil of the gravity 30.5° or 31° Be. and having a viscosity of 215 or 210. Saybolt, is said to be satisfactory for air compressors. Compressor oils should have a solidifying point of below 20° C. and a flash point of 140° to 180° C. They are sometimes artificially colored to a violet tint. The light spindle oil described under ice-machine oil has also been recommended for air compressors.

Conchoidal.—Having shell-shaped depressions or elevations. Thus, a rock breaks with a conchoidal fracture when the faces made by such fracture are irregularly concave or convex.

Concrete (Cement).—An artificial stone made by mixing crushed stone, gravel or slag with a mortar made up of sand and calcined cement such as Portland cement.

Concrete Form Oil.—A non-viscous neutral oil used to prevent the concrete from adhering to the wooden or metal concrete forms. Gravity 34° Baume, viscosity 80° Saybolt.

Concrete Waterproofing Oil.—Summer black oil is said to be satisfactory for waterproofing cement.

Condensate.—The liquid produced by the condensation of a vapor or gas.

Condensed or "Blown Oils."—The bitumens prepared from the residual fluxes by treatment with sulphur or air at high temperatures, are said to be short or lacking in ductility and to be non-adhesive. The effect of such treatment is to produce a material which may be looked upon as dehydrogenerated and condensed as far as its molecular structure is concerned. "Condensed" or "blown" oils all yield much ash-free residual coke, and the effect of the process is to reduce to a marked extent the percentage of saturated hydrocarbons of which they consist and the solubility of the substance in naphtha. Without regard to the character of the petroleums in which they originate, the resulting products resemble one another quite closely. Vegetable oils, such as cottonseed oil, which are thickened by oxidation, for compounding marine cylinder oils, are also known as "blown" oils.

Condenser.—An apparatus for liquifying vapors by cooling only.

Conduction.—Transmission through, or by means of a conductor. Distinguished in the case of heat, from convection and radiation.

Conductor.—In drilling the first string of casing.

Cone Rock Bit.—A rotary drill, composed of two hardened knurling cones the surfaces of which do the cutting as they roll radially due to the rotary motion.

Conformable.—When beds or strata lie upon one another in unbroken and parallel order, and this arrangement shows that no disturbance has taken place at the locality while their deposition was going on, they are said to be conformable. But if one change of condition or a break between the formations of the two sets of rocks, they are said to be unconformable.

Congeal.—To thicken or increase the consistency of a fluid by reducing its temperature, either to a solid or to a semi-liquid pastry state.

Congealation Temperature.—The temperature at which a fluid becomes a solid or is reduced to a pasty state of standard consistency. Thus various tests on the congealation temperature all give different results as all tests do not agree on the final consistency of that material. In the pour test, the consistency is taken as that which will just prevent the liquid from flowing. As a matter of fact, all liquids suffer some degree of congealation at all temperatures.

Conglomerate.—An aggregate of rounded and water-worn pebbles and boulders cemented together into a coherent rock. It is deposited by streams or waves, generally with some sorting and stratification.

Connate Water.—Water which was deposited simultaneously with the deposition of solid sediments and which has not, since its deposition, existed as surface water at atmospheric moisture.

Conservation.—A conserving, preserving, guarding or protecting, a keeping in a safe or entire state; preservation, as of mineral resources. The maximum efficiency with minimum waste in the production of unrenewable resources. Efficiently producing and utilizing petroleum is conservation of the same.

Consistency.—The degree of solidity of fluidity of bituminous materials.

Consistometer.—An instrument for determining the hardness of consistency of semi-fluids such as asphalts, lubricating greases of very thick and heavy oils.

Constant.—An invariable number, or a number which denotes a fixed relation between two or more quantities.

Continuous Process of Distillation.—A petroleum distillation process in which the crude oil flows slowly by gravitation through a series of stills, or retorts, each placed slightly lower than the preceding one. Each still has a carefully maintained temperature, and yields therefore, continuously a product of given volatility.

Contour.—An imaginary line on the surface of the ground, every point of which is at the same altitude.

Contour Map.—A map in which the elevations and depressions are indicated by curved lines or "contours," each line representing an area that is at a constant elevation marked on that line.

Control Head.—A large valve designed to provide a clear opening for the passage of drilling tools and also to act as a head upon the casing.

Controlled Production.—Production of oil under the application of pressure control.

Convection.—The transfer of heat by movements of a gas or fluid (circulation), the particles of the fluid transferring heat from one surface to another by their movements. Such movement is generally induced by difference in temperature existing in different parts of the mass.

Conversion Factors.—Constants or number required to change a set of dimensional units into terms of other dimensional units. Thus, to change inches into millimeters or millimeters into inches; pounds to kilograms; British thermal units into horsepower, etc.

Core.—A sample of material taken from a well being drilled by means of a hollow drilling bit.

Core Barrel.—Part of a drill for sampling formations in well drilling.

Core Bit.—A special bit which has a central tube which receives a core as the cutting proceeds.

Core Drill.—A diamond or other hollow drill for securing cores. Cable core drills and rotary core drills are used with no diamonds.

Core Extractor.—A special jack used to push a core out of a core barrel.

Core Oil.—The grade described as paint oil, 36° Be. gravity, compounded with corn, soya bean or linseed oil, is said to be satisfactory as a core oil.

Core Pusher Plunger.—Used for extracting the core from the core barrel in good condition.

Core Shells.—Used in diamond core drilling.

Correlation.—The determination of the equivalence in geological age and strategraphic position of two formations or other strategraphic units in separated areas; or, more broadly the determination of the contemporaneity of events in the geological histories of two areas. Fossils constitute the chief evidence in problems of correlation.

Corrosion.—The process of wearing away disintegrating or destroying by the gradual separation of small parts of particles, especially by the action of chemical agents, as acids upon metals. See A. P. I. Bulletin 1/31/1928 and F. M. Speller for details. Loss to the oil industry by corrosion is hundreds of millions of dollars annually.

Corrosion and Gumming Test.—The quantity of tarry residue resembling and the decoloration of the copper cup resulting from the complete evaporation of gasoline under standard laboratory conditions.

Corrosion Tests For Oils.—The amount of free acid contained in an oil is indicated by immersing a polished copper strip in an oil for a given length of time and noting the effects produced on the surface. If the copper strip is blackened or otherwise discolored, acid is present in quantity.

Corrugated Friction Socket.—A fishing tool.

Cosmolene or Cosmoline.—Cosmoline or Unguentum Petrolei is a trade-name for petrolatum jelly or vaseline.

Cottonseed Oil Adulterant.—The product described as a paint oil has been used in the adulteration of cottonseed oil.

Counter Balance.—A weight attached to a crank, pulley rim, walking beam or other moving part for the purpose of reducing vibration and stresses. A balancing weight.

Counter Current.—When two fluids, on either side of a partition, flow in opposite directions the flow is said to be counter-current flow. Counter-current condensers or counter-current heaters are those in which the flow of the water and steam is in opposite directions.

Counter Current Pipe Exchanger.—A heat exchanger, constructed of pipe, in which the direction of the cold oil is opposite to that of the hot oil.

Countersink.—A tool used to chamfer the mouth of a hole. The operation that uses a countersink tool.

Countersunk.—Having the shape given by the use of a countersink. Also applied to a certain type of plug which has an opening depressed to receive a square wrench.

Coupling.—A threaded sleeve used to connect two pipes. A device for joining two rope ends without splicing, or the connection between railway cars.

Courtzilite.—A form of asphaltum allied to gilsonite.

Cove Oil.—A 36° Be. mineral oil compounded with a seed oil.

Cover.—The impervious layer overlying an oil or gas sand, which prevents the upward escape of the oil or gas.

Cow Sucker.—A heavy piece of iron attached to a cable to cause it to descend rapidly when not attached to a string of tools.

Crackene.—Aromatic hydrocarbon obtained by Klandy and Fink from the thick residue condensing in the stills during the cracking of Galician oils.

Cracker.—A manila cable, usually 100 ft. long, placed between the string of tools and the wire cable to cause the desired elasticity.

Cracking.—The art of producing low-boiling point hydrocarbons suitable for motor fuel in commercial quantities, from distillates or residue of high molecular weight.

Cracking Distillation.—A process of high temperature and pressure petroleum distillation by which the yield of gasolines and light oils is increased over that obtained by simple distillation. This includes the Burton process, Greenstreet process, and Rittman process.

Cracking of Oil.—A name given to the method by which hydrocarbons of one composition are reduced to lower members of the same series, or converted into other hydrocarbons during distillation. It originated about 50 years ago by the stillmen in the old Pennsylvania refineries, and means just what its connotation conveys, namely, a part alteration, as distinguished from the more complete decomposition which would disrupt the molecule largely into carbon and permanent gas. Cracking simply alters the molecules to an extent that produces an amount of low-boiling fractions that cannot be obtained by simple distillation.

Crank Angle.—The angle made by the centerline of the crank with the centerline of the cylinders or the centerline of the attached slider. The angle through which the crank turns in a unit time.

Crank Case Oil.—Viscous neutral oils of 30.5° and 32° Be. gravity are recommended for gas engine crank cases. A mixture of 30 per cent of 26° Be. cylinder stock and 70 per cent of this with 32° Be. viscous neutral oil has been used for steam crank cases; and an oil of gravity 26° to 27° Be., flash 455° F., and Saybolt viscosity 100 at 212° F., is said to have proved generally satisfactory.

Crank End.—The end of the cylinder next to the crank.

Creosote.—An oily antiseptic fluid obtained by the distillation of wood tar. Also a similar substance obtained from coal. To saturate or impregnate with creosote, as timber to prevent decay.

Cretaceous.—The third and latest of the periods included in the Mesozoic era; also the system of strata deposited in the Cretaceous period.

Crevice Oil.—Oil occurring in shale, as in the Florence, Colorado, oil field.

Cristo-Grahamite.—Grahamite from Cristo mine, Huasteca, Mexico.

Critical Density.—The density at the point where a physical change in a substance takes place. For example that density at which crystallization begins.

Critical Pressure.—The pressure that will just liquify a gas at its critical temperature.

Critical Temperature.—Any temperature marked by a transition. Any temperature at which a change takes place in the physical form of a substance. The temperature at which a gas is just about to change into a liquid or vice versa at a given pressure.

Crop Out.—To be exposed at the surface; referring to strata.

Cropping Out.—The natural exposure of bedrock at the surface. That part of a vein which appears at the surface is called the cropping or outcrop.

Croppings.—Portions of a vein or bed as seen exposed at the surface.

Cross.—A pipe fitting with four branches arranged in pairs, each pair on one axis and the axes at right angles. When the outlets are otherwise arranged the fittings are branch pipes or specials.

Cross Bedding.—Caused by swift, local currents, deltas or swirling wind-gusts and especially characteristic of sandstones, both aqueous and aeolian. Also known as false bedding. Stratification inclined to the true bedding and often confused with the latter. Characteristic of sandstones.

Cross Head.—The sliding element of an engine or compressor which forms a support for the outer end of the piston rod and forms a point of attachment for the connecting rod. It takes up the angular side thrust of the connecting rod end.

Cross Over.—A small fitting like a double offset or the letter "U" with ends turned out. It is only made in small sizes and used to pass the flow of one pipe past another when the pipes are in the same plane.

Cross Over Tee.—A fitting made along lines similar to the cross-over, but having at one end two openings in a tee head whose plane is at right angles to the plane of the crossover bend.

Cross Stratification.—The condition of having the minor laminations oblique to the plane of the main stratum which they help to compose.

Cross Wires or Hairs.—The wires or hairs crossing at right angles in microscopes and surveying telescopes, in the exact line of the optic center of the instrument.

Crow Foot Bar.—A brace placed in the upper part of a boiler to stay some part.

Crown Block.—A set of sheave pulleys arranged in a frame and set on top of the derrick generally including four casings, one crown and one sand pulley. When fully rigged up there are three lines used through these pulleys.

Crown Pulley.—The pulley in the center of the group of pulleys, or in the central portion of the crown block over which the drilling line passes. It carries the load of the string of tools when a well is being drilled by the cable method.

Crown Sheet.—The upper steel plates in an oil still. A sheet of steel that forms the upper part of a firebox in the boiler.

Crucible Steel.—Steel refined in crucible pots, the pots being placed in a crucible furnace. The flame does not come into direct contact with the metal.

Crude.—In a natural state; not altered, refined or prepared for use by any process, as crude ore. A name for crude petroleum.

Crude Oil (Asphalt Base).—Crude oils in which the naphthenes predominate in the residue after distillation, or pariffine wax, then it is a Paraffine Base oil.

Crude Naphtha.—Unrefined petroleum naphtha.

Crusader.—A wooden sailing ship 643 tons register. One of the first sailing vessels to be converted into oil carriers in 1885. The Crusader was fitted with 47 independent tanks, arranged in three superimposed tiers, an arrangement which was found to work satisfactorily.

Crusher Oil.—An oil which has been recommended for crushers contains 50 per cent of summer black oil and 50 per cent of 26° Be., steam refined cylinder stock.

Crystalloid.—A substance which, in solution, diffuses readily through animal membranes lowers the freezing point of the solvent, and generally is capable of being crystallized.

Cumen.—Hydrocarbon formula $C_{12}H_9$ first found by De la Rue and Muller in Rangoon oil.

Cup Grease.—A lubricant used for shafts, generally consisting of a lime soap impregnated with mineral oil.

Curve Grease.—A grease adapted for use on railroad curves.

Cut Back Products.—Petroleum tar distillates which have been "Fluxed" or thinned out by the use of a small portion of their lighter distillates or other similar distillates.

Cut Fraction.—A group of hydrocarbon obtained by the distillation of crude petroleum which condense or liquify at a given temperature or which have a certain gravity. The liquefaction temperature and gravity are purely arbitrary, hence a "Cut" may include any desired percentage of the crude. When the distillation stream is "cut" or discontinued at about 410° F., the fractions included up to this temperature represent commercial gasoline. The "Cut" next below this, or the group of hydrocarbons which are to be separated and given a certain commercial name or classification.

Cut Oil.—Oil which is partly emulsified by mixture with water in the presence of gas or air.

Curly Shale.—A pumpherston oil shale. Its thickness is about 6 ft., and it yields 20 gal. of crude oil and from 60 to 70 lbs. of ammonium sulphate per ton. Any folded or distorted oil shale.

Cuts.—Divisions of petroleum distillates according to temperature gravity, or percentage of the amount distilled.

Cuttings.—The rock particles bailed from a drilled well. Metal removed in the process of reducing to form with machine tools.

Cycle, Cracking.—A series of operation or process in cracking petroleums into lighter products, or the series of changes in composition taking place during these operations.

Cycle, Electric-Alternating Current Cycle.—A complete series of current flow directions of an alternating current, comprising two "Alternations" or two single vibrations, each in opposite directions. An ALTERNATION consists of a surge of current in one direction, out or back. The cycles numerically are given in terms of the second, or so many cycles per second. The ordinary lighting current for city distribution is usually a 60 cycle per second current, while the current for factories and mills where there are many motors is often 25 cycle current.

Cyclic.—A term applied to certain hydrocarbons, the properties of which are best explained by the assumption that some of the atoms of carbon are connected in a ring; or in several rings.

Cylinder Clearance.—The volume remaining at the inner end of the compression stroke, or volume between the piston and the end of the cylinder. In steam engines the clearance is sometimes taken as being the linear distance between the piston and cylinder head (shop practice). The volume considered clearance is inclusive of all space as when filled with a fluid which enters all pockets or irregular space.

Cylinder Displacement.—The volume swept out by the piston in one working stroke, not including the clearance space. It is the volume of an imaginary cylinder described by the full stroke movement of the piston and is equal to the area of the piston multiplied by the stroke. Given in cubic inches. This is a rough means of rating the output of an engine if the performance of a similar type is known. Racing automobile engines are classed according to the total displacement of all cylinders.

Cylinder Oil.—Name given to a product of the distillation of petroleum obtained from the residue. Its specific gravity ranges from 0.914 to 0.980.

Cylinder Stocks.—Steamed cylinder stocks, oils which are used in the lubrication of steam cylinders, for which purpose they are frequently compounded with fatty oils, are the steam residues from paraffine-base crude oils. They vary in gravity from 20° to 27° Be., in flash from 650° to 475° F., in viscosity from 350 sec. to 100 sec. Saybolt universal viscosimeter at 210° F., and in cold test from 30° to 60° F. They are dark green in color and contain varying amounts of asphaltic matter, depending upon the quality of crude oil refined and the care exercised in refining. These oils are often refined and filtrated through fuller's earth or bone-black, which process lowers the specific gravity and the cold test, but reduces the viscosity; all these changes depend upon the extent of filtration. Filtered cylinder stocks may be recognized by their transparency. Valve or cylinder oils are often compounded with tallow oil or neatsfoot oil.

Cymogene.—A light hydrocarbon, nearly pure butane, obtained by compression from natural gas at high pressure. It has been used as a refrigerating medium in ice machines, and as a local anesthetic where the nerves are to be numbed by the cold obtained by the rapid evaporation of a volatile fluid. It has a boiling point of about0° C., and a gravity averaging 100° Be.

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Dag.—Defloculated Acheson graphite. Very finely divided, air-floated graphite used for lubrication and more particularly for mixing with mineral oils or water.

Danforth's Oil.—The trade-name of a petroleum distillate. It is used as a solvent and for burning in vapor stoves.

Datum Horizon.—Any horizon used as a reference for elevations. For most topographic work the datum plane is mean sea level. In structural mapping the bed, or horizon to which all elevations are finally reduced is called datum horizons, or key bed. In surveys for irrigation and for other local purposes it is common practice to assume an arbitrary datum and call zero elevation 100 ft. lower than the lowest land.

Dead Center.—A position in which a single cylinder engine cannot start itself; this occurs when the piston is at either end of the stroke, and the center of the crank is exactly on the center line that passes longitudinally through the cylinder. When setting valves it is necessary to place the engine on dead centers.

Dead End.—The closed end of a pipe or system of pipes. The end of a drilling line made fast to some stationary part of a rig.

Dead Line.—A short loop or a short piece of line with loops in either end. A pipe line not in use.

Dead Man.—A timber or masonry block buried in the earth to which a pulling line may be attached, thus serving as an anchor.

Dead Oil.—A name given to those products of distillation consisting of carbolic acid, naphthalene, etc., obtained in the distillation of coal tar, which are heavier than water and which come off at above 340° F. or over. Most petroleum as produced from a well is accompanied by gas from oil originated and even though the gas and oil be run through a separator there is usually some gas still left entrained or trapped in the oil. When this gas leaves the oil as it stands at rest in the tanks it gives the oil the appearance of being alive because gas bubbles are constantly breaking at the surface. This is known as "live oil." When an oil does not carry any entrapped or formation gas, and thus is not marked by bubbles, it is termed "dead oil."

Deadwood.—Roof or coil supports, swing pipes, etc., any permanent material in a tank that displaces volume. In determining the capacity of a tank an estimate must be made for the space occupied by deadwood.

Deblooming.—Bleaching oils by exposing them to the sunlight in shallow pans. The ultra violet rays of the sun bleach out the coloring matter permanetly as is not always the case when chemically bleached.

Deblooming Agents.—Mono-nitrophthalene and yellow coal tar dyes sometimes added to mineral oils to mask the flourescence.

Decane.—A liquid hydrocarbon obtained from Pennsylvania petroleum. Formula C_{10} H_{22}. Specific gravity 0.757. Boiling point 173° C.

Decline.—The decrease in yield of an oil or gas well. The first yield is called the "flush" production. For awhile the decline is rapid, becoming more steady until "settled" production is reached. Decline curves in which yield is plotted against time showing graphically the change in rate of production.

Declination.—The angle which the magnetic needle makes with the geographical meridian.

Decolorizing.—The process of removing suspended, collodial and dissolved impurities from liquid petroleum products by filtering, absorption, acid treatment or redistillation.

Decomposition.—The breaking up of compounds into simpler chemical forms, as by chemical action or by natural decay.

Deep Well Pump.—A pump for deep wells. Many designs for oil wells are small in diameter so they can be lowered inside the well casing. They contain valves and working parts in series all within a single cylinder. The pump is at the lower end of a string of tubing and it is operated through same by a string of sucker rods.

Deferred Production.—Oil production held back in the producing formation as the result of the pressure control.

Definite Proportions Law.—The fundamental chemical law that a chemical compound always contains the same elements in the same proportions by weight.

Degras.—A fat exuded from the skin of a sheep and taken from the wool.

Degree.—A division, space, or interval marked on a mathematical or other instrument as on a thermometer. A unit of measure of angles equal to 1/360 part of a circle.

Dehydrate.—A process whereby water is separated from oil or some other substance. To remove water or moisture. With particular reference to the removal of the water of crystallization.

Dehydrator.—An apparatus in which water is removed from oil. This may be accomplished by settling and gravitational separation; by centrifugal separation; by breaking down emulsion and permit gravitational settling.

Deliquescent.—A solid substance which absorbs enough moisture from the air to convert itself into a liquid or to dissolve itself.

Deltydrated Tars.—Tars from which all water has been removed.

Demand Factor.—A factor or percentage showing the relative power requirements in regard to total consumption or according to a given rate of payment. Thus, if a certain rate is charged for a full load consumption of power or current, it is evident that a higher rate must be charged if the average horsepower falls below the full load figure, in order to pay off the overhead chargeable to the full load installation. The ratio between the average actual load and the full or maximum load is called the "Demand Factor."

Denatured Alcohol.—Alcohol containing such denaturants as acetone or benzol, which makes the alcohol unfit for drinking. Denaturated alcohol is used in the arts as a solvent or in limited cases as a fuel, and it is generally poisonous.

Denaturation.—The addition of substances, harmful or inert, to a product such as alcohol or salt by which it becomes unfit for human consumption.

Densimeter.—An instrument for determining the relative density or the specific gravity of a substance.

Density.—The ratio of the mass of any volume of a substance to the mass of an equal volume of some standard substance. For solids and liquids the standard substance is water.

Denuncia.—In Mexico, and Spanish America, the judicial proceedings by which a person claims and secures the right to mine which he has discovered, or won the title to which has been lost or forfeited by the neglect of the owner to work it, or by his having violated the mining ordinances.

Dephlegmator.—A column or tower with baffles, etc., used in a petroleum refinery to arrest and retain the oil spray being carried over mechanically by the vapor during distillation. The heavy oil that would otherwise be carried over in the form of a spray would contaminate the light distillates; a laboratory instrument used to obtain a finer degree of fractionation of a test oil under distillation, or a better and more complete separation of the various hydrocarbon compounds. The dephlegmating column prevents heavier fractions being carried over than those corresponding to the temperature of distillation. Such a "column" is really a sort of trap which aids in the separation of the heavy components and returns them to the flask.

Depletion.—The act of emptying, reducing or exhausting as the depletion of natural resources. In accounting the writing off value due to depreciation. In mining it refers to the exhaustion of the supply of ore, oil, etc. The loss sustained through the progressive removal of natural resources, as a mineral deposit. Since there is no recuperation or rehabilitation of oil or gas or other reserves, such reserves are wasting assets from the moment production begins. The act of reducing or writing off of assets due to depreciation or exhaustion.

Deposit.—Anything laid down. Formerly applied to suspended matter left by the agency of water, but now made to include also mineral matter in any form, and precipitated by chemical or other agencies, as the ores, etc., in veins.

Depth Gauge.—An instrument or tool used by machinists and engineers to measure accurately to the thousandth part of one inch.

Derrick.—The framed tower placed over an oil well for the support of the drilling tools, for hoisting, or for pulling the casing. It has four legs, is well braced and designed to safely carry heavy loads over 200,000 pounds in some cases. A boom derrick has a supported mast and a swing boom for hoisting purposes. Also called crane.

Derrick Wheel.—A hand wheel which is attached to the headache post of a cable tool drilling well, used with a wire or rod extended to the throttle of the engine to control same.

Desiccated.—Dried to a powdery or granular condition.

Desiccator.—A vessel used for drying the moisture being absorbed by a salt or acid.

Dessiatine.—Russian measure of area equal to 2,699 acres.

Destructive Distillation.—The process of heating an organic compouid in a closed vessel, without access of air, and collecting the products. A process of distillation in which hydrocarbon molecules are broken down. Thus illuminating gas is a product of the destructive distillation of coal. Also called dry distillation and cracking.

Detonate.—To explode with a sudden loud report. To explode gas suddenly within an engine cylinder causing a knock.

Detonation.—An explosion causing excessive pressure and pounding. Due to carbon high compression or low grade gasoline.

Detrital.—Alluvial cones.

Detritus.—The product of the wear or erosion of rocks.

Development.—Any work which actively looks toward bringing in production, such as erecting rigs, building tankage, drilling wells. The process of taking on form.

Devil's Den.—Petroliferous district of the McKittrick field, California, U. S. A. The oil produced has a gravity of 23° Be.

Devil's Pitchfork.—A fishing tool.

Devil's Tar.—Back in 1818 David Beatty was drilling for salt water in Wayne County, Kentucky. Such wells were being operated in Pennsylvania and salt was produced in subjecting the brine to a process of evaporation. Instead of salt water, however, Beatty got a dark colored liquid for which neither he nor his neighbors saw any use. The disdain, tinged with apprehension with which they regarded this substance is indicated by the name they gave it, Devil's tar. The fluid ran down the Big South Fork of the Cumberland River, covering the surface of the water for 35 miles. It caught fire and inflicted heavy damage to property along the banks. They don't call it Devil's tar now. They call it petroleum.

Devonian.—The fourth in order of age of the period comprised in the Paleozoic era, following the Silurian and succeeded by the Carboniferous. Also the system of strata deposited at that time.

Dew Point.—The temperature at which moist air reaches a point of saturation and begins to condense or form "Dew" at a given pressure.

Diaclinal.—Crossing a fold, as a diaclinal river.

Diagram, Indicator.—A curved outline, drawn to the scale of pressure and volumes which shows the pressure distribution during the stroke of an engine, and from which the energy of the cylinder heat may be computed. This diagram or CARD shows the pressure at every point in the stroke, hence, the valve setting and other adjustments can be readily determined.

Dialysis.—The separation of crystalloids and colloids in solution, by means of their unequal diffusion through certain natural or artificial membranes. Thus colloidal substances may be separated from crystalloids the crystoidal substances passing through the membrane partition while the talatinous colloids will not.

Diamond Drill.—A form of rotary rock-drill in which the work is done by abrasion instead of percussion, black diamonds being set in the head of the boring tool. Used in prospecting and development work where a core is desired.

Diamond Drilling System.—A system of drilling which may be classed under the head of rotary "water flush" systems. Used chiefly for boring through very hard formations and for exploration work. The boring is executed by a steel crown, studded with black diamonds, and with the aid of a powerful water flush.

Diasphaltenes.—Those portions of bitumens which are soluble in carbon bisulphide, and in ether, but insoluble in ether-alcohol mixture (equal parts).

Diastrophism.—The process or processes by which the crust of the earth is deformed, producing continents and ocean basins, plateaus and mountains, flextures, folds and faults. Also the result of these processes.

Diatom.—A minute plant provided with a siliceous envelope.

Diatomaceous Earth.—A friable earthy deposit composed of nearly pure silica and consisting essentially of the frustules of the microscopic plants called diatoms.

Diatomaceous Shale.—Bedded rock compound of the siliceous skeletons of diatoms.

Die.—The name of a tool used for cutting threads, usually at one passage. The essential distinctive feature of a die is its multiple cutting edges, while a chasing or threading tool usually has one, or at most, only a few cutting edges. A form used in the process of manufacture such as drop forging, punching sheet metal, shapes, etc.

Die Nipple.—A tool used in recovering drill pipe. It acts as a die, cutting threads on the lost pipe, or tool stems. Used to thread casing for purpose of connecting fittings to close a wild well, the Mary Sudik well No. 1, in Oklahoma City field furnished outstanding example.

Die Stocks.—The holder and handles used to hold and operate hand dies for cutting threads on pipe or rods.

Diesel Engine.—An internal combustion engine of the constant pressure type having an extremely high compression pressure which creates heat for ignition, and a correspondingly high efficiency. In this engine only pure air is compressed, and at the end of the compression stroke the liquid fuel is sprayed into the cylinder and is ignited by contact with the highly heated air. The speed and load is controlled by increasing or decreasing the duration of the oil injection. This engine may be either of the two-stroke cycle or four-stroke cycle type. Cheap heavy oils are burned. Invented by Dr. Rudolph Diesel in 1897.

Differential Pressure.—The difference in pressure between the tubing pressure and the flow-line pressure. It represents the drop flow-line pressure. It represents the drop in pressure of the fluid in passing through the flow-nipple. In case of an orifice meter, the difference of the pressures on the up-stream and the down-stream sides of the orifice. A pressure measured with a differential gauge or with a manometer (U tube).

Diffusate.—Material which, in the process of dialysis, has diffused or passed through the separating membrane.

Dike.—A long and relatively thin body of igneous rock which, while in a state of fusion has entered a fissure in older rocks and has there chilled and solidified. An embankment about a tank to prevent the spread of oil or fire.

Diluent.—That which dilutes, or makes more fluid; a fluid that weakens the strength or consistence of another fluid upon mixture.

Dip.—The angle at which beds or strata are inclined from the horizontal.

Dip Arrow Map.—A crude map used in the fields showing the approximate position of the structures.

Dip Pipe.—A valve in a gas main, so arranged as to dip into water and tar, and thus form a seal. Called also a seal pipe.

Dip Slope.—The slope of an escarpment in the direction of the dip of the beds which form the escarpment.

Dip Throw.—The component of the slip measured parallel with the dip of the strata.

Direction of Strata.—The strike or line of bearing.

Disatrophic.—Process by which earth's crust was deformed and made into continents, rivers, etc.

Disc Bit.—See: Bit, disc.

Discovery.—The first finding of a mineral deposit, including petroleum. The discovery well in a fixed area determines certain rights with respect to taxes in some cases and with respect to manner of production control in restricted fields.

Disintegration.—The breaking asunder and crumbling away of a rock, due to the action of moisture, heat, frost, air, and the internal chemical reaction of the component parts of rock when acted upon by these surface influences.

Dispersion, Chromatic.—The separation of a beam of white light into a "Spectrum" or into the colored component rays that form the white beam.

Displacement.—The volume swept out by the piston of an engine during one stroke, expressed in cubic inches. It is equal to the piston area multiplied by the length of the stroke.

Displacement Horizontal.—A term used by Tollman to designate Strike slip.

Displacement Normal.—A term used by Spurr and Tollman to designate Dip Slip.

Dissociation.—The act or process consisting in the reversible resolution or decomposition of substances with complex molecules into those with simpler ones, which produced by a variation in physical conditions; also the state resulting from such process.

Distillate.—A product of distillation or the fluid condensed from the vapor driven off in the still. Gasoline, naphtha, kerosene, and light lubrication oils are examples of distillates since they are the result of distillation of crude oil; a term for a heavy gasoline or a kerosene having a BAUME gravity of from 45° to 50°. This is much used in California and on the Pacific coast as an engine fuel.

Distillate Fuel Oil.—Fuel oil of heavy gravity. One having a gravity of 34° Be. (7.11 lb. per gallon), has been found to contain 20,250 B. T. U. per pound.

Distillate Wax.—The heavy distillate of the crude which carries the greater part of the paraffin wax in solution. The neutral oil distillate before the separation of the paraffin, and the basis of paraffin wax. This immediately follows the gas oil.

Distillation.—The process of separating a volatile fluid or fluids from a heavier fluid by evaporation and condensation. The more volatile liquids pass out of the heavier liquids and are subsequently condensed into liquid from contact with cool surfaces. The different components of a compound fluid pass off in the inverse order of their boiling points, the fuids having the lowest boiling points passing away first.

Distillation, Batch.—Each still is charged separately and the oil is run down completely in the still before a new charge of "BATCH" is taken in. This is, of course, an intermittent process, since the still must be cleaned out after every batch is finished, must be charged and started over again. The distillates are "Cut" at the desired points as the process proceeds or else a fractionating condenser column is used.

Distillation, Continuous.—A system of distillation in which the crude oil is pumped through a series of stills in succession, each succeeding still being fired at a higher temperature than the stills before it. In this way a fixed group of "Fractions" or hydrocarbon compounds are given off at each still until the oil is finely exhausted at the last still in the series. This is a continuous process and proceeds without interruption.

Distillation, Destructive.—A system of distillation in which the temperature is carried so high as to decompose the heavier components of the crude as well as to carry over the lighter fractions, as in ordinary distillation. See: Cracking.

Distillation Fractional.—To separate a compound fluid into its elementary components by a progressive distillation process, separating the components in order of their boiling points. In FRACTIONAL PETROLEUM distillation the distillation of the crude is carried on with steam which reduces the oil vapor pressures and makes a separation of the various "Fractions" possible below their normal boiling points. This avoids cracking or decomposing, so great a portion of the products as would be the case with dry distillation. Fractional distillation provides only those fractions that originally existed in the crude.

Distillation Loss.—In a standard laboratory distillation, the difference between the volume of liquid originally introduced into the distilling flask and the sum of the recovery residue.

Divining Rod.—Forked twig, usually of witch hazel, supposed to be useful in locating oil or water under the ground. Often termed a doodlebug. Replaced by scientific equipment—seismograph and torsion balance.

Docosane.—Hydrocarbon obtained from Pennsylvania petroleum. The formula is C_{22} H_{46}.

Doctor Solution.—An aqueous solution of sodium plumbite and sodium hydroxide used in making the doctor test.

Doctor Test.—The method of determining whether there is an undesirable amount of sulphur in crude oil or refined oils.

Dodecane.—Paraffine obtained from Pennsylvania petroleums. Its formula is C_{12} H_{26}.

Dodecatylene.—Hydrocarbon of the benzine group obtained from Pennsylvania petroleum. Formula C_{12} H_{24}.

Dodecahydro, Naphthalene.—Naphthalene obtained by Wreden from petroleum. Specific gravity 0.802. Boiling point 153° to 158° C.

Dog.—A steel or iron attachment used by a machinist in lathe work. A ring shaped piece with set screw on one side that grips on to a bar of metal, and a tail on the other, that is used to give a rotating motion corresponding to that of the face plate. A tempered steel piece that grips and holds certain tools in place.

Dog House.—The little coop near the derrick floor where the drillers or tool dressers keep their clothes when not at work. A small single room building often separated from the main building of a gas or gasolene station where operators may have a stove and be comfortable while not doing active work. Thus providing less fire hazard.

Dog Legs.—One more instance in which Prince has helped out in the terminology of mechanics. Short bends or kinks sometimes appear in the wire cable and some driller, seeing in them a resemblance to the hind legs of a dog, applied the term "dog legs," and it stuck. Also applied to a crooked fair-way of a golf course.

Dollie.—A low frame with wheels or rollers designed to support heavy loads to be moved, as casing dollie to support the end of casing as it is taken into the derrick from the walk way.

Dome.—In geology an uplift in which the beds dip outward in all directions from a center. Oil and gas pools are frequently found beneath domes. An elevated part of a steam boiler from which steam is taken.

Donkey Pump.—Early models of the handy little pump commonly used on jobs of a temporary character about the oil lease and elsewhere sometimes had an irritating habit of stopping when nobody wanted them to and remaining stubbornly motionless when the customary methods supplemented by sundry expedients and harsh language, were employed to start them. These donkey-like peculiarities prompted the name donkey pump. Applied in derision and wrath at first, the name stuck to the machine after its youthful faults had been corrected and it had become wholly tractable and trustworthy.

Dopplerite.—An amorphous, elastic jelly-like brownish black oxygenated hydrocarbon found in peat beds, near Aussee in Styria, at Bad Gonton, Appenzell, and at Obburgen, Switzerland. It has a specific gravity of 1.089 and is insoluble in alcohol and ether .

Dos Bocas.—Name given to a famous oil gusher struck at San Geronimo, Mexico, in July, 1908.

Double Core-Barrel Drill.—A core drill having an inner tube is suspended on bail bearing and thus may remain still while the outer tube revolves. It is designed to bring out a core from a delicate material with a minimum of breaking or other damage.

Double Extra Strong.—The correct term or name for a certain class of very thick pipe which is often called double extra heavy pipe.

Dracorubin Paper.—A paper saturated with an ester of dragon's blood, and used for testing the purity of benzol.

Dragon's Blood.—A powder used for testing benzol. It is a bright red color and is used in titration tests.

Draw Works.—A counter shaft and drum substituted in rotary drilling for the band-wheel, calf-wheel, bull-wheel and sand reel used in the cable-tool method. Modern designs are provided with gears for several speeds, and provide control of feed, etc. A most important part of rotary drilling equipment.

Drawing Oil.—Used for wire drawing dies (lubrication).

Dress.—To dress tools, to sharpen the drilling bit, and to restore them to size and condition for drilling.

Dresser Coupling.—A sleeve and packing made to join plain end pipe. Invented by Mr. Dresser.

Drift.—A tool of peculiar construction used in oil wells for straightening bulged casing. (See whip stock.) The floating mist of a spray pond which may be carried away by the air; a long tapered punch used in tank building to drive into rivet holes to bring them in line.

Drill.—A metallic tool for boring in hard material; the ordinary miner's drill is a steel bar with a chisel-shaped end, and is struck with a hammer; the cutting tools that are used in drilling machine in drilling holes in metal either by power or hand. The tool composed of a bit and a stem for drilling oil wells.

Drill Core.—A solid, cylindrical core of rock cut out by a diamond or shot drill, forms a record of the strata penetrated. A sample of material secured from a well in broken biscuit-like form by a special tool used in cable tool drilling.

Drill Pipe.—The pipe used as auger stem in drilling a rotary well. In modern drilling methods this pipe may be required to connect in a single string of 8000 feet or more. The quality must be of the best seamless alloy heat-treated steel. Thus it will be seen this is no ordinary pipe.

Drill Rods (Drill Couplings).—Apparatus used in diamond core drilling. The rods and couplings are so connected as to operate the diamond set bit while water or mud-laden liquid circulates through the stem and up the hole.

Drill-Stem.—The heavy steel shaft to which the bit jars and connections are screwed to complete a string of tools in the cable tool system of drilling. In the rotary system the string of heavy tubing which extends to the bit and which rotates with same.

Driller.—A workman who has served some time and acquired a degree of skill which entitles him to assume the responsibility of attending to the drilling of a deep well.

Drilling.—A term denoting the different processes employed for the discovery and extraction of petroleum and natural gas. The two systems in general use are Percussion, in which a sharp-pointed instrument is made to strike the ground in a series of blows, and Rotary, which permits of the extraction of a core or allows the disintegrated material to be washed away.

Drilling Control.—The control of the rate of feed accomplished by hand or by automatic means; a machine which automatically controls the rate of feed in drilling.

Drilling Engine.—An engine used in drilling wells.

Drilling Engines, Internal Combustion.—Drilling engines of the internal combustion types includes gas, oil and Diesel engines of both single and multiple cylinder design.

Drilling Engine, Steam.—There are duplex and single steam engines for drilling; the former used for rotary, the latter for cable tool drilling.

Drilling In.—The process of drilling through the cap rock into the oil reservoir of an oil pool.

Drilling Jars.—Jars with a short stroke, usually placed above the auger stem in a string of tools; used to impart a sharp blow in dislodging the tools. A double link of heavy steel.

Drilling Machine.—A portable rig used in drilling wells.

Drip.—A drain or drain connection. An attachment to a natural gas well or gas line to arrest any liquid that might find its way into the gas mains and cause trouble. Name given to an arrangement attached to natural gas wells in order to exclude from the mains any liquid, such as oil or water, which may accompany the gas.

Drips.—Filter drainage too dark in color to be included in filtered stock. They are set aside for charging into the next filter in succession. Natural gasoline recovered from gas lines.

Drive.—Any power transmission system. Thus we have the belt drive, chain drive, etc.

Drive Pipe.—A thick type of casing of relatively large size fitted at its lower end with a sharp steel shoe. It is designed to be driven by use of heavy tools which are operated from a walking beam or jerk line much in the manner of cable drilling.

Drive Pipe Ring.—A device for holding the drive pipe while it is being driven into place.

Drive Shoe.—A protecting end attached to the bottom of the drive pipe and casing. See: Casing Shoe.

Driven Well.—A well which is sunk by driving a casing at the end of which there is a drive point.

Driver and Driven.—That part of the mechanism supplying the energy is called the driver, while that to which the energy is given is called the driven. Thus we have driving and driven wheels.

Driver's Oil.—Non-viscous petroleum oil for coal mines, 34° Be. or paint oil.

Driving Cap.—A cap of iron fitted to the top of a pipe, as in an oil well, to receive the blow when driven and thus protect the pipe .

Dropping Point (Temperature).—That temperature at which some of the grease placed on the end of a test thermometer softens sufficiently to drop of its own weight.

Droozhba.—One of the world's greatest oil wells was struck at Balaghani, Baku district, in 1883.

Drowned.—A term describing the conditions of a well when water is present in large enough quantities to make production unprofitable, or when the water actually forces back the oil in the producing horizon.

Drum.—A metal container or barrel for shipping oil. A winding drum is barrel shaped with flanges. To wind a drill line or hoisting line upon.

Dry Cleaning Gasoline.—Gasoline of 66° to 68° Be., or deodorized naphtha of 58° to 60° Be. is used for dry cleaning.

Dry Distillation.—Destructive distillation.

Dry Gas.—Natural gas obtained from sands that produce gas only. It does not contain the heavier fractions which may easily condense under normal atmospheric conditions. In the hydrocarbon series Methane and Ethane are dry gasses.

Dry Hole.—Somewhat loosely used in oil work, but in general any well that does not produce oil or gas in commercial quantities. A dry hole may flow water, or gas, or may even yield some oil to the pump.

Dry Natural Gas.—A gas that does not contain any considerable amount of easily separated gasoline.

Dry Pipe.—A pipe which extends from the dome to the steam pipe in a locomotive it conveys dry steam.

Dry Point.—The temperature at which the still finally becomes dry or at which no more liquid is distilled or given off. The temperature of the heaviest fraction; commonly called the "End Point."

Dry Sand.—A non-productive strata in oil fields.

Dual System.—A rig which has both cable tools and after a well is completed to the cap rock and the casing is cemented, then the cable tool sometimes called standardized equipment is used to complete the well, thus the dual system.

Ductility.—The amount of "Stretch" or "Give" in a solid possible without cracking or breaking. The unit of plasticity or of the internal adhesion of particles.

Ductility of Asphalt.—The measure of the ability of an asphalt cement to contract and expand without cracking or breaking.

Dump Bailer.—A bailer provided for the purpose of cementing the bottom of a well.

Dunnet Shale.—An oil shale, from 4 to 12 feet in thickness, found in Scotland; it yields from 24 to 33 gallons of crude oil per ton.

Duotriacontane.—C_{32} H_{66}. A heavy paraffine hydrocarbon of the heavy lubricating oil and paraffine class. Baume gravity 35°.

Durbon.—A natural carbon paint, manufactured from shale. Shale is heated in air-tight retorts, and both the distillate of oil and the black residue are used in the production of DURBON.

Dust Laying Oils.—Crude oils, heavy asphalt oils, tars, solutions of petroleum asphalt in gas oils, liquid asphalt, and emulsions of oils and water used for laying dust on roads.

Duster.—An unproductive hole that was drilled in the hope of discovering oil or gas in commercial quantity.

Dutch Oven.—An extended boiler furnace for smokeless combustion.

Duty of Pumps.—A rating given to steam pumps regarding their economy. The "duty" of a pump is the work done in foot pounds per 1000 pounds of dry steam or per 1,000,000 B. T. U. furnished by the boiler. Although the latter is more rational yet it is not so commonly used as the output in foot pounds per 1,000 pounds of dry steam.

Duxite.—A resin from the lignite of Dux, Bohemia; it fuses at 246° C., has a specific gravity of 1133 and is near walchowite.

Dynamometer.—A device for measuring the horsepower development by an engine or motor, or the torque and efficiency. The dynamometer places a known load on the machine either by friction by creating air currents or by generating electric current. The latter is the quickest and simplest for testing motors. An instrument used in weighing wells by determining the load at all times during revolution. It is attached to the beam and acts as a hanger of the rods. Also used on rod lines to band-wheel powers.

Dysodile.—A very inflammable, flexible, slightly elastic yellow or greenish gray material from Melili, Sicily, and from certain German lignine deposits; it has a specific gravity of 1.14 to 1.25.

E

Earth.—The solid matter of the globe as distinguished from water and air; the ground; the firm land of the earth's surface.

Earth Oil.—Petroleum.

Earth, Fuller's.—A non-plastic clay of porous texture used in the filtering and decolorization of oils.

Ebano.—In 1908 four grades of Ebano Mexican residual pitches were on the market. Ebano "E" contained 99.4 per cent of bitumen soluble in carbon disulphide, 1 per cent of paraffin scale, 5.9 per cent of sulphur, and 19.2 per cent of ash-free residual coke. Ebano "DX" contained 97.9 per cent of bitumen soluble in carbon disulphide, 1.3 per cent of paraffine scale, 6.33 per cent of sulphur, and 23.9 per cent of ash-free residual coke. Ebano "D" contained 97.8 per cent of bitumen soluble in carbon disulphide, 1.3 per cent of paraffine scale, 6.08 per cent of sulphur, and 24.9 per cent of ash-free residual coke. Ebano "B" contained 95.8 per cent of bitumen soluble in carbon disulphide, 1.9 per cent of paraffin scale, 6.9 per cent of sulphur, and 30.5 per cent of ash free residual coke.

Ebullition.—Boiling or bubbling.

Eccentric.—A circular disc having a strap or cast ring fetted to the outer circumference which slides allowing the disc to rotate while it stands still. The disc has a hub and bore hole off center through

which a shaft passes and the two are keyed together. The rotation of the shaft gives a crank motion to the strap. An eccentric acts like a crank in operating valves of an engine or of a compressor.

Eccentric Bit.—A modified form of chisel used in drilling, in which one end of the cutting edge is extended further from the center of the bit than the other. The eccentric bit renders under-reaming unnecessary. It is very useful in hard rock.

Edge Water.—In oil and gas wells, water that holds the oil and gas in the higher structural positions. Edge water usually encroaches on a field after much of the oil and gas have been recovered and the pressure has been greatly reduced. The name is due to the fact that such water first appears at one edge (the low side of structure) of a pool.

Education Pipe.—The exhaust pipe from a low pressure cylinder to the condenser.

Edward's Balance.—A balance for determining the specific gravity of gases.

Effective Pressure.—The pressure at a given point on the face of the oil bearing formation in a well. Due to the great thickness of some oil zones, particularly in California, the effective pressure in the lower part of the oil zone may be as much as several hundred pounds per square inch more than the effective pressure in the upper part. For that reason the term "Mean effective pressure" is used to indicate the average effective pressure on the series of oil sands comprising the productive zone. Pressure in an engine cylinder which creates effect.

Efficiency, Mechanical.—The ratio of the work done by a machine to the work supplied to it. Thus, if an engine develops 230 foot pounds of energy from the 1000 foot pounds of energy supplied to it in the form of fuel energy, then the efficiency will be: 230/1000 equal 0.230 equal 23 per cent.

Efficiency, Thermal.—The ratio of the heat in the steam generated to the heat supplied to a boiler in the form of fuel is the thermal efficiency of a boiler. Likewise the ratio of work done to the heat energy received by an engine is the thermal efficiency of the engine. The work done must be converted from foot pounds to British Thermal Units.

Efficiency, Volumetric.—The ratio of the volume delivered from the discharge of a pump or compressor to the volume displaced by the plungers or pistons of same.

Efflux.—The rate of flow out of a vessel or from an orifice.

Effusion.—The exit or exhaust of a gas through an orifice.

Effusion Method of Specific Gravity.—A means of determining the specific gravity of a gas by comparing the times required for the exit or effusion of the gas through a standard office with the time for air.

Eicosane.—$C_{20}H_{42}$. A petroleum of the paraffin series.

Elaine.—Commercial oleic acid, of a fair degree of purity.

Elaterite.—A massive emorphous dark-brown hydrocarbon ranging from soft and elastic to hard and brittle. It melts in a candle flame without decrepitation, has a conchoidal fracture and gives a brown

streak. A bitumen known as "Mineral India Rubber," having great elasticity.

Elbow, Ell.—A fitting that makes an angle between adjacent pipes. There are elbows of 90°, 45°, and sometimes special angles; also called "Ell."

Electric Switch Oil.—An oil used for submerging certain types of electric switches, circuit breakers and motor starters. When the switch jaws open under the oil, the oil chills and breaks down the arc. It is a light oil, moisture proof and carbon free.

Electrolysis.—Act or process of chemical decomposition by the action of an electric current; water mains are sometimes so effected due to electric current from street cars.

Electrolyte.—The solution in which electrolytic separation of metals is carried on.

Electrons (Corpuscles).—It is generally believed at the present time that the atom is built up of very much smaller than the atom itself. All of these electrons are alike, the difference between the atoms of different elements being due to the different numbers and arrangement of the electrons.

Element.—A form of matter of the simplest type and one which cannot be reduced into matter weighing less without decomposition taking place. An element combines with other elements to form a compound, hence an atom is the smallest part of an element capable of entering into chemical combinations, or further, the atom and the element are identical.

Elevator.—A hinged circle or latch block provided with long links to hang on the elevator hook used to hoist casing tubing and sucker rods. A device for raising or lowering tubing, casing, or drive pipe, from or into a well. Some large elevators are fitted with slips.

Elevation of a Point.—The vertical distance of the point above mean sea level.

Ell.—See Elbow.

Elliott Test.—A tester used for determining the flash and fire points of an oil. This is a closed type tester.

Emanations.—Gaseous discharges.

Emoline White Oil.—A water-white, odorless oil for medical purposes.

Empirical Formula.—A rule or equation that is not based on rational development but which represents "Rule-of-the-thumb-practice". It is not a logical development but one which has proved in practice to be at least approximately correct.

Emulsicool.—A cutting compound which, when mixed with water, forms an emulsion. It is said to be especially adapted for cutting and drilling when machining tough steel.

Emulsification Test.—A test made on a mineral oil to determine its tendency toward forming an emulsion with water, or the amount of emulsion possible with an animal or vegetable oil. Mineral oils should form as little emulsion as possible, especially lubricating oils

as the emulsion obstructs the flow of the oil in pipes, produces slimy deposits and reduces the lubricating or fuel value. On the other hand, animal and vegetable oils are often used as soaps and in this case a high emulsifying value is essential.

Emulsion.—A liquid mixture in which a fatty or resinous substance is suspended in minute particles, almost equivalent to molecular dispersion. A combination of water and oily material made miscible with water through the action of a saponifying or other agent.

End Point, Dry Point.—The temperature at which the last drop exaporates in a distillation test of an oil, or the temperature of the heaviest component of the oil. A test made principally on motor gasolines and benzols.

Endecane.—Hydrocarbon formula C_{11} H_{24}. Obtained from Pennsylvania petroleum.

Endecatylene.—Hydrocarbon of the benzine group obtained by distillation from American petroleum.

Endless Belt.—A belt which has no visible end. The ends having been spliced together carefully. This is the most desirable manner of completing a belt, but it generally requires a tightener.

Endosmosis.—The transmission of a fluid inward through a porous septum or partition which separates it from another fluid of different density. Opposed to exomosis.

Endothermic.—Heat absorbing. An endothermic reaction is one in which heat is absorbed as in the expansion of a gas or in the evaporation of gasoline. Any process by which the working substance absorbes heat is an endothermic process.

End Point of Maximum Temperature.—The highest temperature indicated on the distillation thermometer during standard laboratory distillation.

Energy.—The ability to do work, or the ability to overcome a force or resistance.

Energy, Kinetic.—Energy or motion or the energy expended by a force producing motion. The energy of steam is kinetic when it is expanding and moving the piston against a load.

Energy, Potential.—Latent or hidden energy. Energy not released. Thus the heat energy in coal is potential energy since it has not yet been released by the process of combustion. The boiler steam contains potential energy for it has not yet delivered its energy through expansion.

Engine.—A device for transforming energy from one state into another, but in general, is considered as being a device for transforming all forms of energy into mechanical energy of force and motion. Thus, an engine converts heat or electrical energy into mechanical energy or work.

Engine, Atomizing.—An engine in which the fuel is sprayed into the cylinder during suction.

Engine (Carbureting).—An internal combustion engine using liquid fuels, the fuels being atomized or vaporized in a device external to the engine known as a "Carbureter". In this type of engine the cor-

rect mixture of air and vaporized fuel is drawn into the cylinder and compressed.

Engine Distillate.—Engine distillate possesses a water-white to light amber color and a gravity of 45° to 50°. Baum.

Engine Four Stroke Cycle, Four Cycle.—An internal combustion engine having one working stroke or power impulse every fourth stroke of the piston or every second revolution. Thus there is one impulse every other revolution.

Engine, Gas.—An internal combustion engine using gas as a fuel.

Engine, Hot Air.—A heat engine expanding hot air, the air being heated within the working cylinder but with the flame on the outside. This is therefore a type of external combustion engine.

Engine Oil.—An oil used for lubricating the external bearings of large steam and gas engines. NOT CYLINDER OIL. This is an oil of medium viscosity, the grade varying with different sizes of engines and engine speeds. Cylinder oil is much heavier and must not be confused with this oil.

Engines, Oil Engines.—An internal combustion engine using heavy oils for fuels such as kerosene, solar oil, fuel oil, gas oil, distillate, etc. See Diesel Engine.

Engine, Semi-Diesel.—An oil engine in which the fuel is sprayed into a heated chamber, extended from the cylinder, this vaporizing the heavy fuel and also igniting it. The chamber is maintained at at red heat and easily ignites heavy oils at the end of the compression stroke.

Engine, Two Stroke Cycle, Two Cycle.—An internal combustion engine in which there is an explosion or power impulse every other stroke or one impulse per revolution. This gives twice as many impulses as the Four Stroke Cycle Engine.

Engine, Uniflow.—A steam engine with a central exhaust port cut into the cylinder walls which is uncovered by the piston at the end of the stroke, the exhaust therefore being controlled by the piston. As the admission valves are located in the cylinder heads, the steam flow in one direction (Uniflow) from the heads to the center of the cylinder thus avoiding much of the loss due to cylinder condensation.

Engler Degree, Engler Viscosity.—A unit of viscosity in which the time of flow (Efflux) of an oil sample is compared to the time required for the efflux of an equal amount of water (200 c. c.). This is really specific viscosity, and is considerably different than the Saybolt unit commonly used for lubricating oils. The Engler degree is used principally for the determination of fuel oil viscosity in America, although it is used universally in Europe.

Engler Flask.—A flask used in a distillation test of petroleum oils. The Engler flask has a spherical bottom and a long straight neck, a thin inclined outlet tube being attached to the side and at about the middle of the neck. A thermometer is placed within the neck and just level with the outlet so that the temperature of the distilled vapor may be taken as it leaves for the condenser through the outlet.

Engler-Ubelohde Apparatus.—A distillation oil testing device consisting of an Engler flask connected with a water jacketed condenser. The percentage of the various fractions distillating at different temperatures may therefore be easily determined by measuring the condensed distillate leaving the condenser.

Eocene.—Name given to the oldest series of strata included in the American and Russian oil field, as well as the minor oil fields of the world, eocene strata has been a fruitful source of petroleum.

Equivalent Evaporation.—The weight of water which would be evaporated under assumed stand conditions by the amount of heat actually absorbed by the boiler is called the EQUIVALENT EVAPORATION FROM AND AT 212°F. The A. S. M. E. define a boiler horsepower as the equivalent evaporation of 34.5 pounds of water from and at 212°F. This is the same as 33,479 B. T. U. per hour. With the steam at any other temperature, it must be reduced to this equivalent evaporization.

Erg.—This is the metric unit of work (energy) based on the C. G.-S. system. It is equal to " 1 Dyne-centimeter" or the work accomplished by a force of one dyne acting through a distance of one centimeter.

Erosion.—The group of process whereby earthy or rock material is loosened or dissolved and removed from any part of the earth's surface. It includes the processes of weathering solution, corrosion, and transportation. The mechanical wear and transportation are effected by running water, waves, moving ice, or winds, which use rock fragments to pound or grind other rocks to powder or sand.

Escarpment or Scrap—A cliff or relatively steep slope separating level or gently sloping tracts.

Eshka Method.—A method of determining the sulphur content in petroleum oil.

Ethane.—A colorless, gaseous compound (C_2 H_6) of the paraffin series contained in the gases off by petroleum and in illuminating gas.

Ethanol.—C_2 H_6 O., same as Ethyl Alcohol. A colorless fluid used as a reagent. Any one of a class of organic substances derived from the aliphatic hydrocarbons by the substitution of one or more hydroxyl groups for an equal number of hydrogen atoms, excepting that in rare cases only and only where modifying constitutional influences are present two hydroxyl groups or more are never united to the same carbon atom.

Ether.—A highly volatile, inflammable light mobile colorless liquid used as an anesthetic and solvent.

Ether, Petroleum.—A group of the most volatile hydrocarbons obtained from natural gas far from the distillation of petroleum. It is of the paraffine series has a low boiling point, and is highly inflammable. It is used as a solvent and as a local anesthetic.

Ether From Petroleum.—For some time petroleum was used as a source of ethylene for the production of ethyl ether.

Ethyl Chloride.—A liquid of low boiling point often used as a refrigerating medium on small ice machine and also as a local anesthetic.

Ethylene.—A colorless gas ($C_2 H_4$) first member of the unsaturated $C_n H_{2n}$ series of hydrocarbons. It has a sweetish odor and taste and is a frequent product of destructive distillation. It burns with a highly luminous flame. Often called olefiant gas or heavy carbureted hydrogen.

Ethylene Series, Olefines.—A series of unsaturated hydrocarbons also called the olefines, and containing such compounds as ethylene, propylene, butylene, amylene, etc. These hydrocarbons contribute much of the disagreeable odor to unrefined gasoline and may be removed by sulphuric acid. This odor is intensified by sulphur.

Eudiometer.—An instrument for the volumetric measurement and analysis of gases.

Eusomite.—An amorphous, brownish yellow, brittle oxygenated hyerocarbon from clefts in brown coal at Baiershof, near Thumsenreuth, in the Fichtelgebirge; it has a specific gravity of 1.2 to 1.5 and dissolves easily in alcohol and ether.

Eupion.—A fragrant, inflammable oily liquid produced by the dry distillation of bones and similar organic matter. It contains the higher hydrocarbons of the paraffine series.

Eusmite.—An amorphous, brownish yellow, brittle oxygenated hydrocarbon from clefts in brown coal at Baiershof, near Thumsenreuth, in Fichtelgebirge; it has a specific gravity of 1.2 to 1.5 and dissolves easily in alcohol and ether.

Evaporate.—To convert into vapor, usually by means of heat; to evaporate; also to remove and dissipate by this process .

Evaporation, Factor of.—A factor used to reduce the actual to the common base of evaporation in a boiler. One pound of water evaporated in one hour under average atmospheric conditions and from water at 212° F to steam at 212° F is the base. The factor of evaporation is the ratio of the heat required to generate 1 pound of steam actual conditions at boiler pressure to that required to generate 1 pound of steam from and at 212°F.

Evaporation Loss.—The loss of fluid volume or weight due to the time evaporation of the fluid. It varies with the temperature, the amount of fluid surface exposed, the boiling temperature of the fluid, the velocity of air over the surface exposed, the boiling temperature of the fluid, the velocity of air over the surface, and tightness of tank. Since petroleum products are not homogenous fluids, the rate of evaporation is not constant, being greatest at the beginning when the largest percentage of light volatile hydrocarbons are present and slowest when evaporation has proceeded so far that only heavy residues are left. The loss of gasoline and light fractions is, of course, greater than with heavy oils under the same condition.

Evaporation Test.—A test applied to volatile petroleum products to determine the rate at which it will evaporate under fixed condition.

Exhaust Head.—Placed on the exhaust outlet of a steam engine to catch the condensed steam and to reduce the noise.

Exhaustion.—The process of completely extracting from a substance whatever is removable by a given solvent.

Exothermic.—Elements producing heat when combining to form compounds.

Expander.—A device for expanding the end of a tube, in a tube-plate or casing in a well. An engine utilized to expand tail gas of a compression gasoline plant for the purpose of refrigerating and stripping gasoline from the gas; this being the last operation before the residue gas is delivered to fuel lines.

Expansion Bit.—A drill bit that may be adjusted for holes of various sizes. Generally used by a carpenter to bore large holes for templates when hanging foundation bolts for machinery.

Expansion Coil.—Cooling coil in refrigeration system, pipe coil containing the expanded gas.

Expansion, Compound.—Expansion in two stages or completed in two cylinders. Such as in a compound steam engine.

Expansion, Gas.—The increase in volume of a gas due to changes in temperature or pressure. The expansion is said to be ADIABATIC when no heat is taken from or added to the gas when expanding. The expansion is said to be ISOTHERMAL when the gas is held at constant temperature by adding heat. For further detail look up "Boyl's law" in any hand book on gas.

Expansion Joint.—A device used in connecting up long lines of pipe, to permit linear expansion or contraction as the temperature rises or falls.

Expansion Line.—The line on a graph or diagram of pressures and volumes which shows the pressure variation during the period of expansion. A line drawn by an indicator during the expansion stroke of an engine.

Expansion Loop.—Either a bend like the letter "U" or a coil in a line of pipe to provide for expansion or contraction.

Expansion, Petroleum.—Increase of volume due to heat varies with different oils. It is customary to deduct 1 per cent from the measured volume for each 20° above 60°F. An equivalent correction is added for each 20° below 60°F. This is assumed for an average crude petroleum, and while arbitrary is generally used, equal to a coeficient of .0005.

Expansion, Polytropic.—A class of gaseous expansion taking place approximately in heat engines and expressed by PV^n equal constant. Different conditions are met by changing the value of the exponent (n). This exponent represents the ratios of the specific heats of the gas at constant pressure and constant volume.

Expansion Ratio.—The ratio of the gas volume after expansion to the gas volume before expansion. The ratio of the low pressure cylinder volume to the high pressure cylinder volume in a steam engine. The ratio of the expansions taking place in the low and high pressure cylinders of an engine.

Expansion Ring.—A hoop or ring of U-section used to join lengths of pipe so as to permit of expansion.

Expansion Valve.—A special valve used in refrigerating systems through which the liquefied gas (under high pressure) is allowed to escape into a lower pressure and thus expand into a gas. This expansion absorbs heat from surrounding objects and produces the refrigerating effect.

Exploitation.—The extraction and utilization of minerals. (often confused with exploration).

Explosion.—An instantaneous collapse of a compound resulting in high pressures. A detonation or high pressure surge. This is often a misused term especially when applied to internal combustion engines. IN GAS AND GASOLINE ENGINES the fuel does NOT explode in the proper sense when the engine is in normal operation, but is burned very rapidly according to the usual laws of combustion. The rapidity of the combustion in the cylinder has resulted in the improper but popular use of the word, "Explosion". However, when the cylinders are filled with incandescent carbon or when the compression pressure is too high for the fuel being used, then we have real "Explosion" or detonations due to the simultaneous collapse of large masses of vapor. This produces pounding or "Pinking", and builds up excessively high pressures and stresses.

Explosion, Limits of.—The limiting percentages of a vaporized fuel in a mixture with air which will include the range of combustible mixtures. The high and low limit of fuel and air mixtures which will burn in the cylinder of an engine.

Explosion Ratio.—The ratio of the air to the vaporized fuel. The ratio of the explosion pressure to the compression pressure.

Explosive.—Any mixture or chemical compound by whose decompositions or combustion gas is generated with such rapidity that it can be used for blasting or in firearms; for example gunpowder, dynamite, etc.

Export Oil.—An illuminating oil for export; it is usually of 44° Be. gravity or lighter. That for England is of 73° Abel flash-point and that of Germany has a flash-point of 21° Celsius; both are of standard white quality.

Exposure.—The condition or fact of being exposed to view, either naturally or artificially. Hence, also, that part of a rock bed or formation which is so exposed; an outcrop.

Exterpolation.—From known values and laws governing them, to estimate or predict values beyond or outside of the given values.

Extra Heavy.—When applied to pipe, means pipe thicker than standard pipe, when applied to valve and fittings indicates goods suitable for a working pressure of 250 pounds per square inch.

Extra Strong.—The term or name for a certain class of pipe which is heavier than standard pipe and not as heavy as double extra strong pipe.

Extraction.—The process of separating by solvents or by distillation, the desired part of a complex mixture from the undesirable residue.

Exude.—To ooze or flow slowly forth through pores, cracks or gashes; as gums exude from wounded trees, or gas (and oil) exudes from the underlying formation. To discharge through pores or porous membranes. Discharge through microscopic openings.

Eye Bolt.—A rod or bolt having an eye or loop at one end and threaded at the other. Used to hold or to join some part in place, and to screw into a metal part of a machine for the purpose of hoisting.

F.—Abbreviation for Fahrenheit.

Fahrenheit Degree.—The unit of temperature given on a Fahrenheit thermometer. The Fahrenheit Degree is the 1/180 part of the temperature difference between freezing and boiling water. On the Fahrenheit scale water freezes at 32°F. and boils at 212°F. at sea level pressure.

Factor.—A number representing the numerical relation between several quantities. A mathematical process of finding the components of a number which when multiplied together will give that number.

Factor of Safety.—A number showing the ratio of the actual bearking strength of a material to the safe load which the material should support. A steel sucker rod having an ultimate tensil strength of 95,000 pounds per square inch might be considered to have a factor of 4. This would give a safe load of 23,750.

Fabian System.—See: Free Fall. May be described as the father of free fall drilling systems, all others having originated from it, although it is not now used in its original form.

Farewell Sand.—Supposed to be the lowest zone where oil is found in paying quantities.

Fat.—A white or yellowish substance forming the chief part of adipose tissue. It may be solid or liquid. It is soluble in water. When treated with an alkali, the fatty acid units with the alkaline base to form soap.

Fat, Animal.—Such substances as tallow, lard, lard oil, fish oil, etc. May be used alone as lubricants or by compounding with mineral oils

Fat, Vegetable.—Oily compounds having their source in vegetation.

Fat Lux Test.—A means of determining the fatty oils in liquids.

Fatty Acids.—The acids contained in "Fixed Oil" (Animal or Vegetable) which combine with alkalis such as caustic soda or ammonia, to form compounds called soaps. There are a great number of these acids, but the great majority are included in the following series: Arctic, Oleic, Linolic, Recinoleic. Among the individual acids under this series are: Capric, Palmitic, Stearic, Oleic and Rapic.

Fatty Oils.—All fixed oils of the animal and vegetable class which are fluid above 125°F.

Fault.— A break in the continuity of a body of rock, attended by a movement on one side or the other of the break, so that what were once parts of one continuous rock stratum or vein are now separated. The point at which a geological strata "breaks off" or is sheared off by the dropping of a section of the strata due to settling. In many formations, a strata will drop down suddenly along a straight line of shear for many feet below the original trend of the strata. A displacement of the earth's strata.

Fault Block.—A body of rock bounded by faults.

Fault Breccia.—The breccia which is frequently found in a shear zone, more especially in the case of thrust faults.

Fault Dip.—The inclination of the fault plane or shear zone, measured from a horizontal plane.

Fault Escarpment, Scarp.—An escarpment or cliff resulting from a fault or a dislocation of the adjacent rocks.

Fault Fissure.—The fissure produced by a fault, even though it is afterwards filled by a deposit of minerals.

Fault Line, Trace.—The intersection of a fault surface or plane with the surface of the earth or with any artificial surface of reference. Compare trend. The line of intersection of a fault plane with the surface.

Fault Plane.—A surface along which dislocation or faulting has taken place.

Fault Strike.—The direction of the intersection of the fault surface, or the shear zone, with a horizontal surface.

Fault Terrace.—A terrace formed by two parallel fault scraps on the same declivity, thrown in the same direction.

Fauvelie.—System of drilling that was invented in 1846 by an Englishman, Beart, and a French engineer, Fauvelle, providing for the continuous removal of the detritus from the well by means of a water flush or current of water. All the waterflush systems now in use are modifications of the Fauvelle system, which has long ceased to be employed in its original form.

Feddan.—Egyptian measure equal to 1.126 acres.

Fee.—Land operated for oil, gas, etc., under right of ownership as contrasted with land operated under lease. Estates in fee and estates in tail are according to law quite different. The former means ownership by purchase while the latter means ownership by inheritance.

Feed Water.—The water supplied to a boiler to make up for evaporation.

Feed Water Heater.—A device used to heat the feed water by means of the exhaust steam taken from the engine, turbine, or other auxiliary machinery. An OPEN HEATER is one in which the steam comes into direct contact with the water. A CLOSED HEATER is one in which the water is conveyed through the steam space in pipe coils and therefore does not come into contact with the steam.

Felicidad.—Oil bearing district of Venezuela.

Fells Shale.—A Scottish oil-shale said to be the richest in Scotland. It yields from 26 to 40 gallons of crude oil and from 20 to 35 pounds of ammonium sulphate per ton.

Fichtelite.—A white, translucent, brittle, odorless hydrocarbon from peat beds near Redwitz, North Bavaria; it is easily soluble in ether, is soluble in cold nitric acid, and distils without decomposition.

Field Work.—Work done, observations taken or other operations in the field or on the ground as contrasted with work done at, or near the main office. A term used by engineers and geologists.

Fiero.—A flowing oil well struck in the early sixties at Black Creek, Ontario, Canada. Daily output 6000 barrels.

Fifth.—Name given by drillers to one of the most important gas producing sands in Eastern Washington County, Pa., U. S. A., and produces oil in many other parts of Pennsylvania. Its thickness varies from 10 to 50 ft.

Filter.—To pass through to percolate. To separate matter held in suspension. The name of apparatus used to purify oil or other liquids.

Filter, Air.—A device to separate dust from air as it enters a compressor or an engine cylinder.

Filter, Gravity.—A filter in which the fluid flows through the medium by its own weight.

Filter Press.—A machine for the separation of paraffine or other wax from a fluid or semi-fluid by pressure extraction, the pressure squeezing out the fluid content and leaving cakes of wax or other material in the press; used in cotton oil mills, sugar factories, oil refineries, etc.

Filtered Stock.—Lubricating stock that has been filtered through Fuller's earth, or any other filtering medium.

Filtrate.—A liquid which has been separated from solids or semi-solids by passing through a filter.

Filtration.—The act or process of filtering. The process of mechanically removing the undissolved particles in a liquid by passing the liquid through filtering paper, charcoal, sand, etc.

Finger Board.—A board located up in the derrick to support tubing stands.

Fines.—Rock or mineral in too fine or pulverulent a condition to be treated in the same way as ordinary coarse material.

Finishing.—Preparing (oils) for a specified use.

Finishing Barefooted.—When a well finished in hard formation and no casing or screen is set at or near the bottom.

Fire Clay.—A clay used in the manufacture of fire-brick, or used as a mortar in bonding fire-brick in walls.

Fire Box.—The combustion chamber of a boiler.

Fire Damp.—A combustible gas or damp formed by the decomposition of coal or other carbonaceous matter, and consisting chiefly of methane CH_4; also an explosive mixture and air, exploding upon ignition when mixed with atmospheric air.

Fire Door.—The opening in a fire box of a boiler which is above the ash pit and through which the fireman works.

Fire Point.—That temperature at which an oil takes fire and burns continuously when a small flame is applied to its surface.

Fire Test.—A test made on an oil which determines the temperature at which the oil will burn continuously when ignited by a small flame applied to its surface. Every oil has a fixed temperature at which it will catch fire and continue to burn.

Fish.—A name given to any lost article which is in a well and for which fishing must be done. The act of fishing.

Fish Oil Adulterant.—A viscous neutral oil of 32° Be. gravity and 145 Saybolt viscosity has been employed for fish oil adulteration and substitution.

Fish Tail Bit.—A drilling bit for rotary well drilling having a shape similar to a fish's tail. It is used for drilling sand, gravel, and clay, but not hard formations.

Fishing.—Fishing is an operation requiring special tool and a considerable degree of skill. It involves the recovery of lost tools, casing or other articles from a deep well.

Fishing Jars.—Jars used with fishing tools to recover lost tools or casing from a hole. They have a longer stroke than those used in drilling.

Fishing Tap.—A thread cutting tool to cut threads inside a casing or other hollow part that may be a fish.

Fittings.—A term used to denote all those pieces which may be attached to pipes in order to connect or provide outlets, etc.

Fixation.—The act or process by which a fluid or a gas becomes or is rendered firm or stable in consistency, and evaporation or volatilization prevented.

Fixed Carbon.—The organic matter of the residual coke, obtained upon burning hydrocarbon products in a covered vessel in the absence of free oxygen.

Fixed Oils.—Oils which cannot be distilled without decomposition or by changing their chemical composition. Such oils are the vegetable and animal oils. A fixed oil generally provides a squeaking noise when the cork of a bottle is twisted with the oil between the cork and glass.

Flame Propagation.—The rate at which flame spreads through a combustible mixture.

Flange.—A projecting rim, edge, lip or rib. A plate to close a pipe opening or other orifice.

Flanged Joint.—A joint in pipes made by flanges bolted together.

Flange Union.—A fitting consisting of a pair of flanges and bolts to connect them for use on threaded pipe.

Flanged Pipe.—Pipe provided with flanges so that the ends can be held together by means of bolts.

Flash Point.—The temperature to which an oil must be raised to produce enough vapor for a momentary flash when the vapor is ignited under certain standard conditions. There must be enough vapor to obtain momentary ignition but not enough to cause continuous burning. There are a number of standard methods of obtaining this result such as the Abel, Abel-Pensky, Cleveland, Tagliabue, and others, and all of them give somewhat different results. They may be divided into two classes, the open cup and closed cup types.

Flash Test.—A test to determine the flashing point of an oil.

Flask.—A vessel, usually of glass, and a bottle form, used in the laboratory for heating, measuring, or filtering liquids. The box used for holding the sand mould in a foundry.

Flexible Joint.—Any joint between two pipes that permits one of them to be deflected without disturbing the other pipe.

Flint.—A dense, fine grained form of silica which is very tough and breaks with a conchoidal fracture and cutting edges.

Float.—The floating part of an apparatus for indicating the height of liquid in a tank or other vessel. A tool used by a cement finisher in smoothing the surface of cement concrete floors and pavements. An object lighter than liquid will float upon it.

Float Valve.—A valve which is operated by a float. A casing valve.

Floating in Casing.—It becomes necessary on very deep wells to float the casing as it is lowered into the well. This is done by means of a float valve which is made of cast iron to be drilled out after the casing has been cemented.

Floating Roof.—A roof on special tanks which floats upon the oil. This is supposed to reduce evaporation losses and to minimize fire hazards.

Floc Test.—A qualitative test applied to illuminating oils for the detection of substances rendered insoluble by heat. To determine the presence of floculent or suspended matter in a fluid.

Flocculent.—Resembling wool, therefore wooly, coalescing and adhering in flocks. A cloud-like mass of precipitate in a solution. In flakes or flaky suspended matter in fluids.

Flock, Floc.—Any small tufted or flake-like mass of matter floating in a solution especially if produced by precipitation.

Flooding.—The drowning out of a well, by water, ofter resulting from drilling too deeply into the sand. A process by which oil is sometimes driven from the sand into the well by either designed or natural conditions.

Floor Oil.—A non-viscous neutral oil having the same properties as concrete form oil. Floor compound is of the same grade. Such oil should give a good finish and prevent dust from arising.

Floridin.—Fuller's earth from Quincy and Jamieson, Florida, used in decolorizing petroleum products.

Flotation Oil.—An oil used for flotation purposes. Usually a pipe oil or turpentine or a coal-tar derivative although petroleum products have been successfully used for flotation purposes.

Flotation Process.—A concentration process that takes advantage of the principles of surface tension and colloid chemistry with whatever allied principles may be involved, to separate mineral from gangue by means of floating it upon the surface of water or other solutions, while the gangue is induced to sink through the liquid into which the finely ground ore is fed.

Flourene.—A hydrocarbon extracted from coal-tar. Said to be also found in crude petroleum, but in very small quantities.

Flourescence.—A property possessed by some materials of changing the wave length of light reflected from their surface and thus producing different reflected colors than that of the original light. In some cases, the matter will convert invisible light rays or vibra-

tions into hands and streams of color making the substance appear self-luminous. Thus, "X" Rays only become visible when they strike a flourescent substance such as taungstate of calcium. The surface of some oils possess flourescence showing variable bands of colors often called the "BLOOM".

Flow Bean.—A removable steel orifice or restriction that is placed in the flow line from wells to restrict and control the rate of flow of gas and oil from the wells. Sometimes called choker or flow nipple. A name which it is claimed originated from the bean bag used in early practice to pack off or restrict the flow within a well casing, but outside the flow pipe or tubing.

Flow Head.—A type of packed casing head designed to be used upon wells which are being flowed by artificial means.

Flow Line.—The pipe line leading away from a flowing well and which conducts the oil or gas.

Flow Line Pressure.—The pressure on the downstream side of the flow-nipple.

Flow-Nipple.—A short piece of pipe the same size outside of the flow line connections but bored to a much smaller size to restrict the flow, used to control a flowing well.

Flow Point.—The temperature at which non-crystalline hydrocarbon such as asphaltum begin to flow, or become fluid enough to give a visible flow. The measure of fluidity.

Flow Sheet. A diagrammatic drawing showing the sequence of manufacturing or refining operations in the production of such compounds as petroleum oils and waxes.

Flow Tank.—The tank to which the oil is piped from the well and where gas and water may be separated from the oil before the latter goes into a stock tank.

Flowing Plant.—A name sometimes applied to a compression plant where air or gas is compressed for the purpose of the gas lift method of pumping a well.

Flowing Well.—A well from which oil or water flows without pumping.

Flue.—A passage for air, gas, or smoke, for example, a boiler flue, a house flue, a dust flue in a smelter plant, a ventilating flue in a school building, a flue for the escape of gas from the old styled oil flow tank.

Flue Gas.—The gases from the fire or the products of combustion consisting principally of carbon dioxide, carbon monoxide, oxygen and nitrogen.

Flue Gas Analysis.—The chemical analysis of the flue gases made to determine the state of combustion. This analysis enables one to determine whether air is being supplied in proper volume for the complete combustion or whether an excess is being used. The quantity or per cent of carbondioxide CO_2, carbonmonoxide and oxygen is determined with an orsat instrument.

Fluid.—A physical form of matter in which there is an indifferent attraction between the molecules so that the matter does not tend

to maintain its form. Gases and liquids are both fluids in this sense. A fluid requires support if it is to maintain any given form or to maintain any given figure, and therefore possesses the property of "FLOW" or of moving from one point to another by virtue of its weight or an external pressure. It can adapt itself to any form with little applied force.

Fluidimeter.—An instrument devised by H. Joshua Phillips for determining the fluidity of oils at various temperatures.

Fluid Inclusion.—A liquid inclosed in a cavity, usually very minute in a mineral.

Fluid Packed Pump.—A small diameter pump designed to lower within a well tube and depends upon long friction surfaces to prevent fluid from slipping through it.

Flush.—To clean out by letting in a sudden rush of water, or other liquid.

Flush Production.—The yield of an oil well during the early period of production and before the output has settled down to what may be regarded as usual for the field or district in which it is drilled.

Flux.—Any material which cleans the surfaces of molten or softened materials so that they will adhere or enter into combination to form a single integral substance. In smelting a certain material mixed bitumens, generally liquid, used in combination with harder bitumens for the purpose of softening the latter. The materials which are termed fluxes are the residuals left after the removal of distillation of the more volatile fractions of various petroleums until the product is of such a density that it contains little or nothing volatile on heating 50 grams for five hours at a temperature of 325° F. They consist of viscous oils of a character used for fluxing solid asphalts or for direct application to road surfaces as a "carpet coat".

Flux Oil.—A product from asphalt-base petroleum used by roofing concerns and paying contractors to flux natural, asphalts; it is obtainable in various gravities, that of 11° to 14° Be. being most used.

Foaming.—A condition which occurs within a steam boiler when certain impurities are fed with the water into the boiler. The result is that water is carried from the boiler with the steam and interferes with the operation of the engine. A method of extinguishing oil fires by spraying with a foaming liquid.

Foamite.—The trade name for a preparation used in smothering oil fires. A widely used mixture involving foamite is used. This is composed of separate solutions first prepared and then pumped through a mixing chamber as they are discharged upon the oil surface to smother the fire. One is acid the other carbonate. The acid is 13 per cent aluminum sulphate, and 87 per cent water. The carbonate has sodium carbonate 8, foamite 3 and water 89 per cent.

Fold.—A strong flexure of a stratum with steeply inclined sides; loosely and more commonly any flexure of a stratum.

Foots Oil.—An oil containing only low melting point wax of little market value and yet too high a cold test, and too low viscosity for a lubricating product. Oil which the paraffine has been sweated.

Foot Shoe.—A special shoe designed to help float a string of casing when it is being lowered into a well.

Forble Board.—A board or platform located in the upper part of the derrick at a suitable elevation so that a man can attach and detach the elevators from the drill pipe when same is being handled in stands of four joints each.

Force.—That which tends to increase or diminish the velocity of a body. An action between two bodies either changing or tending to change their relative position.

Forced Draft.—A system of mechanical draft in which the air is blown into the ash pit above atmospheric pressure.

Force Feed.—A lubrication system in which the oil is pumped to the individual bearings under pressure.

Forced Production.—The working of a mine or well so as to make it produce a greater output than can be maintained.

Force Pump.—A pump that forces liquids into a line leading to a higher elevation or elevated tank or other condition. A hand pump is often called a force pump.

Forgy Handle.—This is the term still commonly used to designate the handle for the Barnett lever jacks. It had its origin in the fact that William Forgy, of Washington, Pa., was the first salesman to introduce the jack in the oil fields of the East.

Fork.—An appliance used in free fall systems of drilling which serves to hold up the string of tools during connection and disconnection of the rods. A branch or tributary stream to a main river.

Formaniferous.—A shell formation.

Formation.—The ordinary unit of geologic mapping consisting of a large and persistent stratum of some one kind of rock. It is also loosely employed for local and more or less related group of rocks. In Dana's Geology it is applied to the groups of related strata that were formed in a geological period.

Formation Map.—Map showing rock formation by use of color or by various line or generally used where strata have steep dips, gently dipping beds being mapped by contours.

Form Oil.—Used to keep concrete forms from sticking to concrete.

Formolite.—For the determination of the unsaturated cyclic hydrocarbons in a mineral oil, Nastyukov treats the oil with formaldehyde in the presence of concentrated sulphuric acid whereby a solid yellow product has been proposed.

Formolt Reaction.—A reaction indicating the presence of the naphthene series of hydrocarbons.

Fossil.—Any remains, impressions or traces of animal or plant of past geological ages, which have been preserved in a stratified deposit or in a cave.

Fountain Well.—The first well drilled to the famous third sand on Oil Creek in Pennsylvania was completed in May, 1861, by Captain A. B. Funk, and it was named the Fountain well because it flowed about 300 barrels a day. It was the deepest oil well of the period, too, reaching pay at the then unprecedented depth of 460 feet. Prior to this sensational strike the total production of petroleum, all of it

coming from a small area in western Pennsylvania was about 1,300 barrels. When the 300 barrels from Captain Funk's gusher was added there was over-production and depression of prices. The Fountain well continued to flow for six months and then suddenly stopped, choked with paraffin.

Fraction.—A part of the whole or quantity expressed as a part of 1.00 whole unit (Vulgar Fraction), this 1/4, 3/8, 1/32, etc., the division is here expressed but is not carried out in actual figures. One unit of a compound substance or a component of a compound.

Fraction, Petroleum.—An elementary compound or a series of compounds whose boiling point lie within a certain range. Thus, for example, if 10 per cent of the oil is given off at a temperature of 150° F. during a distillation test, then this is an arbitrary "fraction" of that oil, and contains the hydrocarbon oils evaporating at that temperature. The fraction can be anything we choose to make it, or will include any number of the compounds that we desire.

Fractionate.—To separate a mixture into fractions having more or less fixed properties, but which are not necessarily definite compounds.

Fractionation.—Separation by successive operations, each removing from a liquid some proportion of one of the substances. The operation may be one of precipitation, or of crystallization, or of distillation.

Fractional Distillation.—An operation for separating a mixture of two or more liquids which have different boiling points. Used extensively in petroleum distillation. An analytical distillation by which the various fractions or component compounds of a fluid are separated by a process of distillation in order of their boiling points. Thus, petroleum refining is based on fractional distillation since the various components of petroleum such as gasoline, naphtha, kerosene, etc., are driven off in groups and separated by distillation.

Fractional Column.—An apparatus arranged to separate the variation fractions of petroleum by single distillation, the condenser or "Column" being tapped off at different points along its length so as to separate the various fractions in order of their condensing temperatures (Boiling Points).

Frasch Process.—A desulphurizing process which consists of distilling oil with copper oxide, followed by refining with sulphur acid.

Free Carbon.—In tars, organic matter which is insoluble in carbon disulphide.

Free Fall.—An arrangement by which, in deep drilling the bit is allowed to fall freely to the bottom at each drop or down stroke. The process of operating the drill, often called Russian, Canadian and Galician free fall.

Freeze.—To permit drilling tools, casing or drilling pipe to become fastened in a well by reason of caving walls or sand and mud settlings so that such article cannot be pulled out. To lower the temperature until a liquid solidifies.

Freezing Point.—The temperature at which oil ceases to flow.

Friable.—Easily crumbled or pulverized, easily reduced to powder as pumice.

Friction.—A quality attributed to the cementing rubber which holds together the plies of a belt. The resistance to the motion of one material against another.

Fuel Gas.—Gas used for heating, lighting power, etc., as distinguished from gas used in the manufacture of gasoline. Residue gas from a natural gasoline factory.

Fuel Oil.—Any naphtha-free product of petroleum used for the production of power or heat. Fuel oils from Mid-Continent petroleum range from the distillate series, down to and including any product which can be made liquid by steam heat and for which no better market outlet can be obtained. California fuel oil has a gravity of about 17° Be.; it has a flash point of 150° F. and contains about 30 per cent of asphalt. From another standpoint, fuel oils are the distillates heavier than illuminating oils and lighter than lubricating oils, ranging from 25° to 30° Be.

Fuel Oil, Bunker.—Oil used in the Navy or Marine service.

Fuel Oil, Diesel.—A high grade fuel oil free from water, tarry deposits, paraffine and other impurities used as a fuel for Diesel engines.

Fuel Oil, Distillate.—A heavy residual oil left after topping the crude for gasoline and kerosene. It generally, although not always, includes the next fraction the kerosene called "Gas Oil." Light fuel oil distillates average 34°-36° Be., while the heavy or "Reduced" fuel oils may run around 22°-28° Be.

Fuel Ratio.—The amount of heating capacity in a fuel as compared with another fuel taken as a standard.

Fuller's Earth.—A fine earth resembling clay. It is much the same chemically as clay, but has a decidedly higher percentage of water.

Fuming Sulphuric Acid.—An acid made by dissolving sulphur trioxide in concentrated sulphuric acid.

Furnace, Air.—A furnace used for melting cast iron and semi-steel. The metal is carried on a flat bed.

Furnace, Annealing.—A furnace in which metal is heated and allowed to cool slowly to soften and toughen the grain.

Furnace, Muffle.—A furnace arranged with pots or pigeon holes so that the flame does not come into direct contact with the material being heated.

Furnace, Open Hearth.—A type of furnace in which steel is melted, the steel being placed in a horizontal hollowed-out bed called the "hearth." The flame passes over the surface of the metal.

G

Gabian.—A variety of petroleum obtained at Gabian, department of Herault, France.

Gage, Gauge.—To measure or ascertain the amount or contents of, or the capacity of, as of a pipe, barrel or keg. A standard measure of dimensions, distance, or capacity. An instrument for measuring sizes of standard manufactured materials. A gauge to determine pressures.

Gauge Glass.—A glass tube set in gage glass cocks in a vertical position, the whole being connected to a boiler or other vessel for the purpose of observing the liquid level.

Gage Cock.—See Water Gage.

Gage, Mercury.—A gage consisting of a column of mercury, the height of the mercury being proportional to the pressure per unit area. Result may be given either in terms of pounds per square inch or in inches of mercury measured from surface to surface.

Gage, Metal.—A standardized thickness of metal known as a "Gage" or "Gauge Number" is sometimes used in ordering sheet or strips. There are a great number of these gages, applying the metal below ¼", but the U. S. Standard Gage is mostly used for the plates and sheet used in the construction of tanks. Be sure you know which gage is intended for your case.

Gage Pressure.—The pressure in pounds per square inch (or atmosphere), shown by the pressure gage. This shows the pressures above or greater than atmospheric pressure and does not show the ABSOLUTE PRESSURE. The latter pressure is measured from vacuum and is equal to the gage pressure plus the atmospheric pressure, or approximately is equal to the gage pressure plus 14.7. The gage pressure is equal to the absolute pressure minus 14.7 (approximately).

Gage, Water.—A glass tube used to show the height of water in a boiler. A gage used for measuring low pressures such as the air pressures of fans and smoke stack draft. The readings are generally given in "inches of water."

Gager.—One whose business is to systematically determine the amount of oil in a producer's storage.

Gaging.—A small protecting covered opening usually cylindrical in form, about 6 to 8 inches in diameter, located in the roof of a tank, preferably with self-closing cover, which permits the gaging of the tank contents without the necessity of removing the larger manplate.

Gallon.—A measure for liquids. The U. S. Gallon has a volume of 231 cu. in. The Imperial or English gallon 277.274 cu. in. One U. S. gallon equals 3.785332 liters equals 4 quarts equal to 8 pints equals 0.833 Imp. gallons; one Imperial gallon equals 4.5460 liters equals 1.20032 U. S. gallons equals the volume occupied by 10 lbs. of distilled water at 16.7° C.

Gantz.—One of the gas and oil-producing sands of the Amity Quadrangle, Pennsylvania, U. S. A.

Garbet Rod.—A short rod attached to the lower end of a traveling valve of a well pump. Its purpose is to attach to the standing valve for pulling same out of its seat when repairs are necessary.

Gas.—A fluid in which there is repulsion existing between the molecules so that the gas constantly tends to occupy a greater space. A popular term for Gasoline.

Gas, Acetylene.—An unsaturated hydrocarbon colorless gas of garlic odor, slightly soluble in water but soluble in alcohol. It is used as a general anesthetic, for acetylene welding, and cutting metals in organic synthesis and as an illuminant.

Gas, Aerogene.—A fuel gas obtained by carbureting air with gasoline.

Gas Anchor.—A special pipe extended below a pumping barrel of a deep well pump to prevent the pump from becoming gas bound.

Gas Balance.—A scale or balance used to weigh gas or to obtain its specific gravity.

Gas Black.—A superior kind of lampblack, collected by introducing a cold iron surface into a luminous gas flame. See Carbon Black.

Gas, Blast Furnace.—Gas obtained from the waste gases issuing from blast furnaces. It is very lean and can only be burned successfully within the cylinders of a gas engine. It is a by-product of the furnaces.

Gas Burner.—There are many designs of apparatus for use in burning gas. These are all called gas burners.

Gas Carbon.—A compact variety of carbon obtained as an incrustation on the interior of gas retorts, and used for the manufacture of carbon rods or pencils for the electric arc, and for the plates of volataic batteries.

Gas, Carbureted.—Gas which has been treated with oil vapor to increase its luminosity.

Gas Coal.—Any coal that yields a large quantity of illuminating gas in distillation. It should be low in sulphur and other impurities.

Gas, Coke Oven.—A rich coal gas obtained as a by-product of coking ovens where the volatile matter forming the coal is driven or distilled off leaving the coke. This gas is usually processed for the removal of benzine, benzol, ammonia, etc.

Gas Detector.—A device to show the presence of fire-damp, etc., in a mine.

Gas, Dry, Natural.—Natural gas free or nearly free from oil and gasoline vapor.

Gas Engine.—A kind of internal combustion engine using gas as fuel. The gas engine is one of the most used prime movers that furnished power in the field of petroleum production.

Gas Factor.—Also called the gas-oil ratio. The number of cubic feet of gas produced with each barrel of oil.

Gas Field.—A tract or district yielding natural gas.

Gas Furnace.—A furnace using gas for fuel, or one for making gas.

Gas Generator.—An apparatus for generating gas, such as a retort in which hydrocarbons are evolved by heat.

Gas Holder.—A large inverted steel tank or inverted bowl, floated in a basin of water to hold manufactured gas for domestic use.

Gas House Coal Tar.—Coal tar produced in gas-house retorts in the manufacture of illuminating gas from bituminous coal.

Gas, Illuminating.—A gas containing much hydrocarbon vapor to produce a luminous flame. This may be coal gas obtained by the distillation of bituminous coal in retorts, or it may be water or producer gas carbureted with oil vapor.

Gas Lift.—See: Air Lift.

Gas, Liquefied.—Gas put into steel containers under high pressure for portable use. An example is that of Skellgas, a trade name given such a gas.

Gas Mantles.—Cones of some highly refractive salt of thorium or cerium which are heated to incandescense by a gas flame. Used for illumination.

Gas, Natural.—Gaseous hydrocarbon compounds originating within the earth, probably of organic origin, and usually associated more or less closely with petroleum. A gas coming from wells generally rich in such combustibility as methane and ethane. If the gas is "wet," that is contained absorbed vapors of the light petroleum hydrocarbons, it is treated in the manufacture of casinghead gasoline.

Gas Oil.—A petroleum oil of medium gravity which follows the kerosene and precedes the light lubricating oils. It is used for enriching or carbureting water gas to increase its luminosity or is used as a high grade fuel oil. It is a good fuel for internal combustion engines (oil engines). Gas oils are intermediate between burning oil and lubricating oil (b. p. 600°-650° F.). Gas oil from Pennsylvania petroleum usually possesses a gravity of from 34° to 42° Be., a flash point of 230° F., a fire test of 270° F., a cold test of 20° F. As a rule 1 kg. of gas oil yields about 550 liters of gas, 350 grams of tar, and 50 grams of coke.

Gas Oil Ratio.—The number of cubic feet or gas produced per barrel of oil by a well.

Gas Pressure.—Gas pressure is recognized as the chief cause of oil movement in the drainage of wells. There can be no doubt that gravity, hydrostatic pressure and rock pressure, forces foreign to the oil, but brought to bear directly upon it are in part responsible for the flow of oil into the well.

Gas Pressure (Regulating Valve).—A balanced valve with diaphram to regulate the flow of gas depending upon pressure to be maintained in a gas pipe line.

Gas Producer.—A furnace in which coal is burned for the manufacture of producer gas. It is used to produce gas as needed for a gas engine, and controlled by the demand of same.

Gas Sand.—A strata of sand or porous sandstone from which natural gas is obtained.

Gas Separator.—See: Gas Trap.

Gas Spurts.—Little heaps observed on the surface of certain geological strata containing organic matter; so called because believed to be due to the escape of gas.

Gas Tank.—Same as Gas Trap.

Gas Tar.—Coal tar obtained as a by-product in the manufacture of illuminating gas.

Gas Trap—One of many devices for separating and saving the gas from the flow and lead lines of producing oil wells. The mixture of oil and gas is allowed to flow through chamber large enough to reduce

the velocity of the mixture to the point at which the oil and gas tend to separate. The gas seeking the top of the chamber is drawn off free of oil while the oil is discharged at the bottom. Also called Gas Separator, Gas Tank. A gas trap of modern design utilizes centrifugal force, gravity, viscosity, adhesion, law of partial pressures and difference of density in separating fluids.

Gas Water.—Water through which coal gas has been passed, and which has absorbed the impurities of the gas.

Gas Well.—A well from which natural gas in produced, as used in oil and gas leases, a well having such a pressure and volume of gas, and taking into account its proximity to market as can be utilized commercially.

Gas Works.—A manufactory of gas, with all of its machinery and appurtenances. A gas plant.

Gas Zone.—A formation which contains capillary or supercilliary voids, or both that are full of natural gas under considerably more than the atmospheric pressure.

Gaseous.—In the form of, in the nature of gas; pertaining to gases. Lacking substance or solidity. A fluid but not a liquid.

Gasket.—A thin sheet of composition or metal used in making a joint water, gas or steam tight. It is squeezed between metal surfaces.

Gasser.—A well producing only gas.

Gasoline.—An indefinite name for a light distillate of petroleum which covers a wide range of gravities and boiling points. Everything down to 56° BAUME can be considered as gasoline at present or any distillate having an end point higher than 470° F. There is no fixed definition owing to the necessity of continually making deeper "cuts" into the crude. Gasoline is one of the most valuable constituents of petroleum, being used as a fuel for automobile, tractor, boat and truck engines, as a solvent in many manufacturing operations, as a cleanser, etc.

Gasoline, Casinghead.—A gasoline made by mixing the casinghead gasoline obtained from natural gas with naphtha. A motor fuel. The extremely light and volatile gasoline obtained from wet casinghead natural gas. Also called natural gasoline.

Gasoline, Cracked.—Gasoline obtained by high temperature and high pressure distillation of petroleum. The heavier components of the crude are "cracked" or decomposed so as to furnish a greater yield of gasoline than is naturally contained in the crude.

Gasoline, Straight Run.—Gasoline obtained by the fractional distillation of crude petroleum. This is the gasoline naturally contained in the crude and consists of a series of consecutive distillates with uniformly varying boiling points.

Gasoline, Synthetic.—Artificial gasoline from substances other than petroleum or petroleum products.

Gasoline Trap.—A trap especially designed and built for trapping out or removing gasoline, light oils, natural gasoline condensate, and water from natural gas under pressure. They are applied to receivers, heat exchangers, piping, drip pockets, condensers, run down legs, scrubbers, and various other types of equipment in the natural gasoline plant, oil refinery, and oil field.

Gate Valve.—A valve with a sliding gate; a stop gate. When open the flow is straight through it, sometimes called a straightway valve.

Gathering Lines.—Pipes connecting production tanks at oil wells with trunk pipe lines. In natural and casinghead gas systems, the lines that connect with the wells and carry the gas to the main pipe lines.

Geanticline.—An anticline so extremely long and broad that it constitutes more than a local feature.

Gear Case.—An enclosure for gears. In an automobile this generally refers to the case of the transmission gears.

Gear Case Oil.—Oil suitable for the lubrication of gears such as the transmission gears of an automobile. This is a heavy oil strongly adhesive, and should be as little affected by changes in temperature as possible.

Gear Grease.—A compounded grease having strong adhesive properties, one that will not throw off by centrifugal force nor "TRACK."

Gear, Meshing.—Gears are in mesh when the teeth of connected wheels enter into each other to the proper depth, or "run on the pitch line." The act of entering the teeth of gears into contact of shifting from one gear ratio to another as in changing speeds with an automobile transmission gear.

Gear, Spiral.—Helical Gear.—A gear with the teeth curved across the face (slanting). More properly called a "helical gear." The shafts can be parallel or at right angles.

Gear, Spur.—A gear having straight teeth parallel to the shaft centerline.

Gear Train.—A series of meshing gears.

Gelatin Dynamite.—An explosive, the composition of which varies between wide limits, depending upon its use. A typical composition is 62.5 per cent nitroglycerine; 2.5 collodion cotton; 25.5 sodium nitrate; 8.7 meal; 0.8 soda. A plastic, waterproof high explosive of great density, used principally for close work and where it is exposed to water.

Gelignite.—The term by which gelatin dynamite is known abroad.

Generator, Electric.—An electric machine also known as a dynamo used to generate electric current. A rotating member, wound with wire, turns in a magnetic field in such a way that the armature wires cut the magnetic flux and generate electric currents. The generator is driven from some source of power such as a steam or gas engine. A vessel or chamber in which gas in generated.

Geocerite.—A wax like, white oxygenated hydrocarbon which melts at about 80° C.; it is soluble in alcohol and is unacted upon by a hot

potassium hydroxide solution. It is said to have the composition C_{28} H_{56} O_2. Geocerite occurs in the brown coal of Gesterwitz.

Geochemistry.—Most of the rocks that form the crust of the earth consist of aggregates of mineral species, which in turn are in the main compounds of two or more chemical elements. All rocks are subject to the action of various agencies which bring about chemical changes. The study of the various changes is Geochemistry.

Geoline.—A vaseline or petroleum.

Geologic Age.—The age of a given strata or the estimated period in which it was formed. This is purely a relative estimate.

Geological Horizon.—Rocks of one geological age.

Geologic High.—Sometimes used in oil fields to indicate a later geological formation, regardless of elevation; opposed to geologic low, which refers to earlier formation. A relative position as to the structure. High is up the structure as compared to some lower position.

Geology.—The science which treats of the history of the earth and its life, especially as recorded in the rocks. That science treating of the earth's structure, the formation and occurrence of minerals, and the analysis of mineral strata.

Geophone.—A device to determine beneath the surface the exact location of sounds transmitted through the ground. It is a recent invention and may prove useful in finding men imprisoned by mine disasters.

Geophysical.—Relating to the physics of the earth.

Geophysical Prospecting.—A method of prospecting with delicate instruments which will detect sub-surface structures. Torsion balance, seismograph and magnetometer as names of some of the instruments.

Geothermic, Geothermal.—Of, or pertaining to, the heat of the earth's interior.

Geran.—Name of some petroliferous deposits situated about 30 miles southeast of Elizabetpol. Oil is extracted in quantity.

German Vaseline.—This is compounded by dissolving paraffin or ceresin in colorless petroleum oils.

Gilsonite, Uintiate.—A brilliant black and brittle variety of asphalt having a conchoidal fracture. It fuses easily and is soluble in carbon disulphide, alcohol and turpentine.

Gin Pole.—A pole used to support hoisting tackle.

Girth, Girt.—A small girder.

Girth Sheets.—The steel plates forming the sides of an oil still.

Glacial.—In geology pertaining to characteristic of, produced or deposited by, or derived from a glacier.

Glance Pitch.—These are very hard and brittle bitumens of low saturated hydrocarbon content. In the glance pitches, which are very hard and brittle bitumens, the saturated hydrocarbons are reduced to between 6 and 7 per cent. Egyptian glance pitch contains 99.7 per cent of bitumen soluble in carbon disulphide.

Gland.—Designed to close a stuffing box having a tubular projection embracing the rod, extending into the bore of the box, and bearing against the packing.

Globe Valve.—A valve with approximately a spherical chamber. A valve in which a beveled valve is pressed against a seat to close it.

Globule.—A small globe or spherical particle often applied to particles of liquids found in rock cavities, or suspended in other liquids.

Glossary.—A collection of notes or explanation of obsolete words and passages; a partial dictionary, explaining archaic, technical, or other uncommon words.

Gloss Coal.—A variety of brown coal, compact deep black, with conchoidal fracture well developed, possessing a resinous to glossy and metallic luster. It is the hardest and most compact of the lignites; its specific gravity varies from 1.2 to 1.5.

Glycerine, Glycerol.—Obtained from fats. A syrupy colorless or very light yellow fluid. Apparently an oil, but a very poor lubricant, and while it is thick yet this apparent viscosity seems to be of little avail in lubrication. Chiefly interesting because of its connection with fats and fatty oils.

Glycol.—Glycol can be made from oil by first chlorinating and then replacing the chlorine atoms by hydroxyl groups.

Go-Devil.—A scraper with self-adjusting spring blades, inserted in a pipe line and carried forward by the fluid presure, clearing away accumulations from the walls of the pipe. The term is also applied to a weight or small explosive charge dropped to explode a charge of nitroglycerine placed at the bottom of the well.

Goose Neck.—The vapor pipe line on a still. The connecting member of the hose on a rotary swivel.

Gourdon.—A Russian term, meaning a petroleum residue of high flash point. French word for coal tar.

Grab.—A fishing tool.

Graham.—A name given to an improved form of casing perforator used principally in California; perforation is affected by bringing the star wheel into forcible contact with the interior of the casing.

Grahamite.—A comparatively pure, brittle black bitumen which does not melt at a high temperature, but merely intumesces. It is rarely of compact structure, often containing a large proportion of inorganic impurities, and when it is fractured the break is irregular or hackly and the broken surface dull. When mixed with heavy asphaltic fluxes, it is very rubbery and elastic and non-susceptible to heat changes. Used as a substitute for rubber, as a filter between stone and brick blocks, and in the manufacture of flooring varnishes and paints. A hydrocarbon, soluble in carbon disulphide and chloroform, but not in alcohol; it is fusible, has a specific gravity of 1.145, and has a conchoidal fraction. It occurs in vein-like masses in Colorado, Oklahoma and West Virginia.

Gram.—Weight of one cubic centimeter of water 15,432 grains.

Gram-Calorie.—The metric unit of heat quantity. The quantity of heat required to raise 1 gram of water (at about 15° C.), one degree centigrade.

Graphite.—A form of the element carbon. It is intensely black, has a greasy feeling, a metallic luster, and leaves a black mark on paper. It occurs naturally and is also produced artificially in the electric furnace. Graphite is a natural lubricant and may either be used alone in the pure state or combined with a grease or oil to facilitate its application to a bearing. It is incombustible and forms a protective coating on metals. Besides its service as a lubricant, graphite is used in paints, in the manufacture of lead pencils, stove blacking, etc.

Graphite, Acheson.—An artificial graphite prepared in an electric furnace. It is free from grit and organic impurities, making it more suitable for use as a lubricant than the natural graphite.

Graphite, Amorphous.—Uncrystallized graphite or graphite, having particles of no definite crystalline form. Used in paints, lubrication, packing, electrodes and pencils. When used as a lubricant, dry or mixed with oil, it must be entirely free from grit or acid.

Graphite, Artificial.—Graphite made in the electric furnace from anthracite coal and sand.

Graphite, Collodial.—Graphite powdered to an extremely fine subdivision, the particles not being much larger than colloids. The finer the sub-division of the particles the more effective lubricant it becomes and the longer it will stay in solution with water and oil. A colloid is less than microscopic, nearly approaching molecular dimensions.

Graphite, Deflocculated.—Amorphous graphite in a very finely divided state, the particles being nearly of colloidal size. This form of graphite (Acheson Graphite Company) will stay in solution permanetly with oil being in a state of colloidal suspension or flotation, and when tannic acid is added it will remain in suspension in water. This powder is used mixed with oil, water or grease, these three elements acting simply as vehicles for the graphite.

Graphite, Flake.—Graphite in the form of small flat scales. Used as a stove polish, crucibles and refractories, paints, foundry facings and pencils. Crucibles made from graphite are capable of standing the highest degrees of temperature met with in crucible steel furnaces, and the graphite foundry facings protect the moulding sand against the intense heat of the molten metal.

Graphite, Natural.—Natural graphite is mined in the United States and in Ceylon. This is well suited for some purposes, but owing to the grit and organic matter contained in the crude graphite it is not always a suitable medium as a lubricant. There is always danger of grit in natural graphite, no matter how carefully it may be treated.

Gravimetric Analysis.—The quantative determination of the constituents of a compound by weight; contrasted with volumetric analysis.

Gravitation.—The force by which all bodies attract each other, specifically applied to the force by which the earth attracts bodies.

Gravity, Acceleration Due to.—The attraction of the earth for objects on its surface, known as "Gravity," is a force that produces a constant acceleration in falling bodies. This acceleration which is indicated by (g) amounts to 32.16 feet in this latitude, or accelerates at the rate of 32.16 feet per second. In calculations it must be taken into account a body will drop in vacuum the first second only 16.08 ft. because it starts from rest. The formula used to determine the velocity due to this force is $V = \sqrt{2gh}$. V = velocity in feet per second, g = 32.16 and h = the head (or the verticle distance of the fall) in feet.

Gravity Baume.—A convenient scheme for expressing the relative weights of substances lighter than water. Pure water is given a gravity of 10 degrees. See Baume.

Gravity, Center of.—The point at which a body will balance if supported at that point by a frictionless pivot. CENTER OF GRAVITY OF AREA is that point which is effectively central between all points in the outline of the figure. It is the "balancing point" of the figure, or that point at which all moments acting on the plane are balanced.

Gravity, Specific.—The ratio of the weights of equal volume of two substances, one of which is taken as a standard. Water is taken as a standard of comparison for liquids and solids and air is generally taken as the standard for gases, although hydrogen is also used in some cases. The specific gravity is taken at a standard temperature, usually 60° F. in this country. The specific gravity is a decimal for materials of less density than the standard. Thus, if an oil has a specific gravity of 0.7888, then the oil weighs 0.7888 of the weight of an equal volume of water. Specific gravity is a unit of density.

Gravimetric Analysis.—A method of chemical analysis based on units of weight in which all of the substances entering into the reaction are weighed. This is a distinct form VOLUMETRIC ANALYSIS in which volumes of standardized solutions are used as the unit of comparison. Gravimetric methods are more precise.

Gravimetric Units.—Various units of force, work and power in terms of weight. This may be either avoirdupois or metric. This is to distinguish units based on the pound, gram or kilogram from the ABSOLUTE UNITS based on mass. To obtain gravimetric values in pounds, the absolute values must be multiplied by 32.16, the acceleration due to gravity.

Gray's Tester.—An instrument used for determining the flashing point of heavy oils.

Grease.—Properly speaking, this term should only be applied to fatty or oily matter of animal origin; but mixtures of mineral oil with lime and soda-soaps constitute well-known lubricating greases.

Grease Box.—A box or cup containing fat or grease for lubricating a bearing. The grease box of a railroad car is packed with waste and grease.

Grease Cup.—Used to feed grease lubricant to the bearing of a machine.

Grease Plant.—An auxiliary department of certain refineries in which lime and soda soaps of various fatty products, such as inedible lard and tallow oils, horse oils, etc., are compounded with non-viscous paraffin oils or other petroleum products into semi-fluid or pastry lubricants technically called greases.

Green Oil.—The word green in this term refers to the color of certain petroleum and not to any absence of seasoning or maturing. High grade crudes, the Pennsylvania high-grade crudes, the Pennsylvania for example, have a greenish cast. Thus the designation, "green oil," carries with it an implication of high quality. In the Scottish shale-oil industry, the ounce-run crude oil after chemical treatment. It is distilled in the first stage oil stills and is fractioned into aphtha, light oil, heavy oil and heavy oil and wax.

Green Tar.—Barbados petroleum.

Grey Shale.—The grey shale, which was worked at Addiewell, Scotland, lies above the Houston coal, which consists of several thin coal seams.

Griefstem.—The heavy square pipe which works through the square hole in the rotary table and drives the drill stem. Employed in the rotary method of well drilling. Sometimes called Kelly-bar.

Ground Water Level.—The level below which the rock and subsoil down to unknow depths are full of water.

Ground Water.—The water which permeates, in a ubroken sheet, the rock masses on the earth, filling their pores and fissures.

Grout.—A thin cement mixture forced into the crevices of a stratum to prevent ground water from seeping or flowing into an excavation. About 40 to 50 per cent water by weight mixed with neat portland cement; clean sand added makes a mixture often used to cement machinery to foundations.

Growler Board.—A special board made to support a pipe jack which aligns the pipe while it is being screwed in place; used in pipe line construction work.

Guard Rail.—A safe guard to prevent accidents to persons who may come near working machines. Standard guard rails are ordinarily of 1¼" pipe, one rail at 42, the other 21 inches above the floor. The two rails and the supporting posts constitute the guard rail.

Gudgeon.—A short pin or shaft flanged or enlarged at one end to facilitate attaching to a revolving part of a machine and which acts as a supporting journal. See A. P. I. Specifications for gudgeons.

Gulf Binder.—This blown oil is produced from Texas petroleum; it contains 99.4 per cent of bitumen soluble in carbon disulphide, 70.1 per cent of bitumen soluble in 88° Be. naphtha, 48.4 per cent of pure bitumen as saturated hydrocarbons 0.2 per cent. of paraffin scale 0.71 per cent of sulphur, and 14.6 per cent of ash-free residual coke.

Gum Dynamite.—Explosive gelatins.

Gum Resin.—The semi-solid to solid and usually light colored emulsions of mixtures of true resins with various gums (carbohydrates), constituting the sap of certain plants and trees, partly soluble in water.

Gumbo.—Any relatively sticky formation, such as clay, encountered in drilling.

Gummy.—Viscous but without lubricating power, resinous, sticky but not oily.

Gun Barrel.—A small diameter tank originally of wood with staves about 16 ft. high, used as a flow tank to receive the oil, water and gas and which fluids separate before the oil is taken into the oil tank.

Gun Oil.—The oil used for cleaning guns, filling the recoil cylinders, and for hydraulic cylinders. It is a non-viscous oil, free from acid.

Gurley Compass.—A combined compass and clinometer. It has a square metal base with beveled edges which are graduated on two sides in inches and on two sides in degrees of arc. It has a pair of folding open sights, a swinging clinometer and rectangular spirit levels.

Gusher.—A flowing oil well, the term is rarely used by practical oil men. It is used almost exclusively by promoters and stock jobbers.

Guy.—A guide, a rope, chain, or rod attached to anything to steady it; a rope which holds in place the end of a boom, or spar; a rod or rope attached to the top of a derrick and extending obliquely to the ground where it is fastened to a "dead man."

Guy Anchor.—The support to which derrick guys are attached; dead man.

Guy Rings.—Rings on the head block of a derrick mast, to which the guy ropes are attached.

Guyaquillite.—A pale yellow, amorphous, non-resinous oxygenated hydrocarbons, form near Guyaquil, South America; it has the specific gravity 1.092, begins to fuse at 70° C., and is soluble in alcohol.

Gypsum.—Hydrous calcium sulphate C_a SO_4 plus $2H_2O$. It contains 32.5 per cent lime, 46.6 per cent sulphur trioxide and 20.9 per cent water.

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Half-Turn Socket.—In oil well drilling, a fishing tool having jaws bent around in an incomplete circle, to engage lost tools that lean to one side of the well.

Hammer Oil.—Examples of oils used in the lubrication of steam hammers are steam-refined cylinder stocks free from tar, green in color, and having a gravity of 25° or 26° Be., a flash point of 590 or 610; a fire test of 680 or 710, a cold test of 30 and a viscosity of 200 or 245 Saybolt.

Hand Dug Well.—A well excavated with hand tools. This was the earliest method of producing an oil well and followed the even earlier practice of gathering oil from the surface of water and seepages. Hand dug wells were necessarily very shallow.

Hand Level.—An instrument used in field mapping to determine differences in elevation. It can only be used in the crudest type of geological mapping, such as making short branch traverses or side shots.

Hard Pitch.—Pitch showing a penetration of not more than 10.

Harness Oil.—The leather dressing termed "black harness oil" is thus compounded:

	1	2
Leather oil	40 gal.	40 gal.
Oleic acid	2 gal.	.....
Yellow petroleum	12 lbs.	8 lbs.
Aniline color	1½ lbs.	1½ lbs.
Nitrobenzene	2 parts	1½ parts
Ebonite black wax	.....	12 lbs.

The term "harness oil" is also applied to cylinder stock with 5 per cent of neatsfoot oil. Harness oil should possess a glossy black color.

Harvester Oil.—A product of high fire test and viscosity. It is sometimes compounded with graphite for use on heavy engines and farm machinery. Castor machine oil is also used on harvester and farm machinery.

Hatchettine.—A yellowish white, wax-yellow or greenish yellow hydrocarbon which darkens on exposure; it melts at 46° C., is sparingly soluble in boiling alcohol and cold ether, and is decomposed by concentrated sulphuric acid. Its specific gravity varies from 0.892 to 0.983.

Head.—This word is used to express pressure of a fluid upon a unit area due to the height at which the surface of the fluid stands above the point where the pressure is taken. Often expressed in "pounds per square inch" and also stated in "feet." A head of pure water at 60 degrees F. and 100 ft. high equals a pressure of 43.31 pounds per square inch. Head due to other liquid is proportional to the specific gravity of same. The circular end plate of an oil still, a boiler, an engine cylinder, etc. The action of a well when flowing intermittently.

Headache Post.—A post set under the walking beam at one side of the derrick floor. The beam rests upon the headache post, which prevents it from falling upon the workmen when the pitman is disconnected from the crank. It is said the driller leans on the headache post when escaping gas causes his head to ache. An upright support either wood or steel to support the forward end of the walking beam.

Head, Hydraulic.—The height of a fluid column, usually considered as water, which maintains a pressure on a surface. This pressure head may be given in terms of the pressure per square area or simply as the height of a water column in feet or inches. With low pressures, as in measuring smokestack draft, the head is given in inches of water, while in computations for water power the head is given in feet.

Header.—A large pipe into which sets of boilers are connected by suitable nozzles or tees, or similar large pipes from which a number of smaller ones lead to consuming points. Largely used for tubes of water-tube boilers. More properly called "manifold."

Headgear.—That part of the drilling apparatus which remains at the surface. A name seldom used by American oil operators, but applicable to the various devices worn by aviators, soldiers and mine rescuers.

Headlight Oil.—An illuminating oil, suitable for use in the headlight lamps of locomotives it is usually of 150° F. fire test "Signal oil."

Heat.—A form of energy which is convertible into mechanical energy through its property of causing expansion. Heat energy may be considered as due to the vibration of molecules and causes molecular vibration, an increase of temperature increasing the orbits or the range of the path taken up by the vibrating molecule Heat may be produced by the chemical process of combustion, by the expenditure of mechanical or electrical energy in over coming resistance, by hammering and compacting or by mechanically mixing certain substances.

Heat Balance.—According to the laws of the conservation of energy, energy can neither be created nor destroyed. Hence there must always be a perfect palance or equality between the heat energy supplied and the energy given out by a machine. The number of heat units supplied to a boiler in the form of coal must exactly "balance" the useful energy developed by the engine plus the heat and frictional losses that take place during the transformation of the heat into mechanical energy. A HEAT BALANCE SHEET shows the heat delivered in the form of fuel set out and against the useful energy produced and the various losses.

Heat Content.—The quantity of heat contained in a solid, gas or fluid; the quantity of heat available in a fuel.

Heat, Convection.—The transfer of heat from one body to another by circulation currents of a fluid.

Heat Exchange.—A system of heating oil, water or gas by absorbing the heat from some medium which must be cooled; as hot air or vapor.

Heat Conversion Factors.—Factors or constants for converting units of heat energy into units of mechanical or electrical energy.

Heat Insulator.—A material which conducts little or no heat. A non-conductor.

Heat Latent.—When a body is heated to the boiling point or melting point its physical structure undergoes a change, and a certain quantity of heat is used to tear the body apart into its new form, the temperature remaining constant at the boiling or melting point until completely evaporated or melted. The heat that is thus supplied in changing form is called the "Latent Heat" or the "Hidden Heat," since the supply of heat causes no increase in temperature nor external evidence of its presence. Thus in boiling at atmospheric pressure, water rises to the boiling temperature (212° F.) and no higher until all of the water is converted into steam. The latent heat is quoted in British Thermal Units or Calories.

Heat, Latent Heat of Evaporation.—The quantity of heat absorbed B. T. U. or Calories to change the substance from a liquid into a vapor. The quantity required depends upon the nature of the substance, the pressure and the quantity evaporated. One pound of water at sea level air pressure requires 971.7 B. T. U. to convert it into steam after it is at a boiling temperature. This is its latent heat which is composed of two parts; that required to form steam is 898.8 B.T.U., that required to expand the steam against atmospheric pressure is 72.9 B. T. U.

Heat, Latent Heat of Fusion.—This is the quantity of heat required to melt a solid at a fixed temperature or to convert it from a solid into a liquid. Thus, a piece of ice raised to 32° F. starts to melt and continues constantly at the temperature until all of the ice is melted. The heat absorbed during the melting was latent heat of fusion.

Heat, Mechanical Equivalent.—A factor used to convert heat units into mechanical units. One B. T. U. equals 778 foot pounds. Some authors give 777.54 or 777.64.

Heat of Combustion.—The heat evolved when a substance is completely burned in oxygen.

Heat of Liquid.—The heat required to raise a pound of water from 32° F. to the boiling point, the boiling temperature depending upon the pressure. Thus the heat of liquid is greater at high pressures than at low for the reason that the boiling temperature is higher.

Heat Quantity, Insensible Heat.—The quantity or volume of heat is not sensible to the touch, and it is therefore often called the "Invisible Heat." This is as different from the temperature or "Sensible Heat" as gallons are from pounds per square inch. Heat quantity is the amount of heat energy absorbed in raising the temperature of a body or conveying it into another physical state, and in the latter case is not accompanied by a change in temperature. It is the same thing as "Work" in mechanics, the temperature corresponding to the force or pressure acting while the heat quantity corresponds to the distance displaced. Heat quantity is given in terms of "Heat Units," the British thermal unit B. T. U. or the calory.

Heat, Radiation.—Heat rays that are transmitted in a manner similar to light.

Heat, Specific.—The quantity of heat required to raise one unit of weight of a given substance by one degree. In this country, the specific heat is the amount of heat required to raise one pound of matter one degree, Fahrenheit. Water is taken at unity, it requiring one B. T. U. to raise one pound of water one degree Fahrenheit. In the metric system the GRAM-CALORY is the amount of heat required to raise one gram of material one degree centigrade, hence the specific heat in the metric units is the heat required to raise one gram of material one degree water being taken at unity. The specific heat of gases is given in relation to the heat required to raise a unit weight of air or hydrogen one thermometer degree.

Heat, Temperature, Sensible Heat.—The degree of heat "PRESSURE" indicated by the thermometer. The intensity of heat or the degree of heat concentration. The temperature is given in Fahrenheit or Centigrade degrees.

Heat Test.—A test applied to lubricating and transformer oils to determine their stability toward heat and also to detect incomplete or improper refining for specific purpose .

Heat Treatment.—A process of changing the structure of a material generally a metal, by a system of heating and cooling. Thus, tempering and hardening steels are heat treatment methods.

Heat Unit.—The unit of heat quantity such as the British Thermal Unit B. T. U. or the calory. See: British Thermal Unit.

Heat Value.—The heating value of a fuel in B. T. U. or calories.

Heat Value, Higher.—The total heat value of a fuel, including the heat of the products of combustion, the latter being cooled down to the temperature of the original fuel temperature. In a calorimeter test of a fuel, carbon dioxide and water vapor are produced by the combustion of the carbon and hydrogen elements respectively, and if these are allowed to escape at a high temperature they carry off considerable heat, especially the water vapor which contains the latent heat of vaporization. In the determination of the "Higher Heating Value," the water vapor is condensed within the calorimeter and this heat is thus abstracted and recorded. This is equivalent to actual practical conditions where the gases are cooled to low temperatures, a case, however, which seldom occurs. This value is given in heat units B. T. U., or calories.

Heat Value, Lower.—The "lower heating value" of a fuel neglects the heat carried off by the products of cumbustion since in the majority of actual practical cases the gases are not cooled down nor condensed on the heating surfaces. The lower heating value is therefore equal to the total heat of combustion (Higher Heating Value) minus the quantity of heat carried off in the vapor.

Heater, Feed Water.—A form of heater for heating boiler supply water before it is pumped into the boiler. See: Feed Water Heater.

Heating Surface.—The area in square feet of the boiler surface actually coming into contact with the flame and hot gases of combustion. In a firetub or tubular boiler this includes the lower third of the shell, the area of the flues or tubes, and the net area of the heads.

Heavy Carbureted Hydrogen.—Ethylene; often called olefiant gas.

Heavy Lubricating Oils.—While in some instances, this may apply to lubricating oils of high specific gravity (Low Baume gravity) it is heavier than water. Specific gravity equals 1.04, and most of it distills between 200° F. ad 300° F.

Hecla Sandtone.—Name given to a division of strata yielding oil in the United States.

Hectare.—A measure of area equal to 2.4711 acres.

Height of Instrument.—The elevation above mean sea level or other datum, of the line of sight in a surveying instrument.

Helderberg Limestone.—Name given in the United States to a divisian of the Silurian strata. It supplies petroleum chiefly in Ohio.

Helenite.—A wax near ozokerite, but elastic like caoutchouc; it has a yellow color and specific gravity of 0.915. It occurs at Ropa in Galicia.

Helical Gears, Spiral Gears.—A helical gear, often misnamed "Spiral Gear," is a special form of worm gear, the teeth slanting in helical curves across the face of the gear. Unlike the spur gear, the teeth of mashing helical gears slide over one another and for this reason they must be continuously lubricated by immersing them in a bath of oil.

Helium.—An inert gas found in the atmosphere and in certain natural gases. It is non-combustible and very light, and has been proposed as a substitute for hydrogen in balloons and dirigibles. It is very expensive because of its rarity and the difficulty met with in extracting it. It is extracted from natural gas by means of combined compression and refrigeration; all other gas condenses leaving only Helium.

Helix.—A screw thread or the path traced by a revolving point which at the same time moves forward along a straight line. This is the curve formed by coil springs, the teeth of helical gears and the threads of screws.

Heneicosene.—Hydrocarbon symbol C_{21} H_{24}. Boiling point 230° to 231°. Obtained from Pennsylvania petroleum.

Hentricontane.—Name of a hydrocarbon separated from the solid hydrocarbons found in Pennslyvania oil wells by Professor Mabery—Specific gravity 0.7997 at 70°. Hentricontane (C_{31} H_{64}) has been separated by MABERY from the solid hydrocarbons that collect in certain Pennsylvania oil wells.

Heptane.—(C$_7$ H$_{16}$) Heptyl Hydride; Menthyl Hexane.—One of the liquid paraffine series of petroleum hydrocarbons of the saturated order. It forms a part of gasoline and is a volatile and inflammable liquid. Specific gravity equals 0.694, boiling point equals 173° F.

Herringbone Gears.—A double helical gear with the teeth slanting both ways from the center of the face in a series of "V's." It is generally made by placing two helical gears right and left. It is very strong and practically noiseless. As with helica gears, it must be lubricated by an oil bath.

Hexacosane.—(C_{26} H_{24}) has been separated from Pennsylvania petroleum by MABERY; also separated this hydrocarbon during the course of an investigation into the composition of commercial paraffin.

Hexadecane.—A paraffine obtained from petroleum. Formula C_{14} H_{24} Specific gravity 0.792.

Hexahydro-Benzine.—Hydrocarbon of the naphthalene group. Formula C_6 H_{12}. Specific gravity 0.7539.

Hexahydrocumene.—Hydrocarbon of the naphthalene group. Formula C_9 H_{18}. Specific gravity 0.7812.

Hexamethylene.—On hexamethylene from American and Galician petroleum.

Hexane.—(C_6 H_{14}). A light and volatile paraffine hydrocarbon fluid forming a part of gasoline. Specific gravity equals 0.660; boiling point equals 69° C. It is highly inflammable.

Hexylene.—Hydrocarbon obtained from petroleum. Formula C_6 H_{12}.

High Dip.—Any downward slope or slant is called a dip, and the geology of oil is full of such slopes and slants. So an angle at which a bed or stratum of the earth's crust is inclined from the horizontal is called a dip. A high dip is one of more than 5 per cent.

Hircite.—An amorphous, brown, resinoid, oxygenated hydrocarbon, soluble in sulphuric acid and partly so in alcohol.

Hofmannite.—A crystalline, colorless, tasteless and odorless mineral possesing a specific gravity of 1.0565; it melts at 71° C. and has the composition C_{20} $H_{36}O$. It forms a white crystalline efflorescence on lignite in the vicinity of Siena.

Hog Still.—A refinery colloquialism for a simple form of tower still in which the very light products only, such as benzine are separated by the use of steam.

Hole.—The drill hole or well bore.

Hollow Reamer.—A tool for straightening a crooked hole.

Homocline.—A monocline. A succession of beds dipping in one direction.

Homogeneous.—Of the same kind or nature consisting of similar parts or of elements of a like nature; opposed to heterogeneous.

Homologous.—Having a similar structure, proportion, value or position, proportional to each other identical in nature, relation, or the like.

Homologous Series.—A series or organic compounds, the members of which differ from each other by a multiple of CH_2.

Hopper.—A box-like chamber with open top as on some engine to receive water, cement mixers, etc.

Hopper Cooled.—An internal combustion engine is sometimes provided with a box-like top over the cylinder which supplies water storage for cooling the cylinder. This is said to be a hopper-cooled engine.

Horizon.—The strata all over the earth which were formed at the same time and said to belong to the same geological horizon. The horizontal line where the sky and sea seem to meet.

Horizontal Segment.—A segment of a circle lying in a horizontal plane; particularly applied to the half segment formed by a measuring tape drawn over the vertical lap joint of the side sheet of a tank.

Horley Sedgley Water Finder.—An instrument used for ascertaining the amount of water in a tank containing oil.

Horn Socket.—A well boring, an implement to recover lost tools, especially broken drill poles, etc. It consists of a conical socket the larger end downward, which slides over the broken part; a spring latch gripping in when entered. Frequently a flaring mouthpiece is riveted to the horn socket, making it a bell-mouth socket.

Horsepower (H. P.).—The commercial unit of mechanical power or the rate of doing work. It is equal to the expenditure of 33,000 foot pounds per minute or 550 foot pounds per second. The force or weight moved in pounds multiplied by the velocity in feet per minute gives the foot pounds per minute. This product divided by 33,000 gives the horsepower.

Horsepower, Brake.—B. H. P. See: Brake Horsepower.

Horsepower, Electrical.—K. W., K. V. A. The electrical unit of power is the KILOWAT, which is equal to 1,000 watts or approximately 1.33 mechanical horsepower. More exactly, the kilowatt equals

1,000/746 mechanical horsepower since 746 watts are the equivalent of a horsepower. With alternating current machinery it is customary to rate the machine in "Kilo-Volt-Amperes" (K. V. A.), which is the same thing as the kilowat when the power factor of the alternating current is unity.

Horsepower, Gas Engine.—With a given size cylinder the horsepower of a gas engine is a variable quantity. It varies with the compression pressure, the valve size. The fuel used, the altitude, piston speed, and a number of other factors. Even with the same engine and fuel the power varies from the day because of atmospheric variations.

Horsepower-Hour (H. P. Hr.).—One horsepower expended for one hour, or the horsepower multiplied by the hour. This unit is used in computing the fuel consumption of an engine, the fuel being given as the number of pounds of fuel per horsepower. The equivalent of 1,980,000 feet pounds of work.

Horsepower, Indicated.—(I. H. P.) The horsepower as calculated from the indicator cards. This is the power developed within the cylinder of the engine and is more than the power delivered at the driving shaft by the amount of mechanical friction. See indicated horsepower.

Hot Well.—A well or tank into which the hot water from the condenser is discharged. In case of the barometric condenser the well must be large enough to supply a quantity to fill the discharge pipe from the condenser to the elevation due to vacuum.

Housing.—The casing for a machine or part thereof. It is also a device for shutting off a leak in a pipe or fitting.

Humidity.—The degree of moisture contained in the air. This is expressed as the "Relative Humidity" and is the ratio of the moisture actually contained to the amount required to saturate the air at the same temperature. Thus if the relative humidity is 0.75 the air contains 0.75 of the amount required to saturate the air at that temperature. When the humidity approaches or exceeds 1.00, then the moisture is precipitated in dew.

Hurry-Up-Stick.—The name obviously comes from the use to which the device is put. The hurry-up-stick is a board with a hole in one end, used to turn the T-screw at the end of the temper screw. With this implement the driller is able to reach the T-screw when the beam is in motion. Thus making the operation of turning the screw more easily and rapidly performed.

Hydrate.—A compound formed by the union of water with some other substance and represented as actually containing water, a hydroxide, as calcium hydrate.

Hydrated.—Containing water in chemical combination, and hence in a definite proportion in each case; a gypsum, which contains water of crystallization; calcium hydrate, lime which has absorbed water.

Hydraulic.—Of or pertaining to fluids in motion; conveying or acting by water, as hydraulic mining.

Hydraulic Circulating System.—A method of drilling by which mud-laden fluid is circulated during drilling.

Hydraulic Elevator.—A large ejector which utilizes a high velocity stream of water passing through a nozzle directed through a chamber which has a side connection to a suction pipe and thus a vacuum or suction draws in gravel and other water and propels the whole through a throat and then up through a conductor pipe. Used in mining. The principle thus employed is also used in mixing cement for wells.

Hydraulic Grant.—A giant nozzle used in directing a stream for cutting away and washing down gravel and earth in the process of mining.

Hydraulic Jack.—A jack for lifting, in which pressure on the moving part is transmitted by a liquid, as water or oil.

Hydraulic Press Oil.—The non-viscous neutral oil described under concrete form oil has been recommended for use on hydraulic presses.

Hydride.—Combination of hydrogen with a radical group or an element.

Hydrocarbons.—A compound containing only a combination of carbon with hydrogen. This excludes such compounds as alcohol which also contain oxygen in addition to the carbon and hydrogen. There are a large number of these compounds and they form the basis of all petroleum products. They may exist as gases, as liquids or as solids. Examples being methane, Hexane, and Asphaltum, respectively. Various hydrocarbons are also contained in bituminous coal and the tarry residues obtained from this coal.

Hydrocarbons, Chain.—A hydrocarbon series, such as the paraffine series, in which the hydrocarbon atoms are bound to the carbon atoms in a chain form, or with the succeeding carbon atoms aligned along a straight line with a hydrogen atom on either side.

Example: $\begin{matrix} & H & \\ H & C & H \\ & H & \end{matrix}$ $\begin{matrix} & HH & \\ H & C & C & H \\ & HH & \end{matrix}$ etc., indicated by $C_n H_{2n+2}$

Hydrocarbons, Paraffine Series.—A series of petroleum hydrocarbons having the general formula: ($C_n H_{2n+2}$) and including Methane, Ethane, Propane, Butane, Pentane, etc.

Hydrocarbons, Ring Compound.—A hydrocarbon molecule in which the carbon atoms are arranged in ring form to which one hydrogen atom is connected to each carbon atom in radial position. This is also known as a "Cyclic Compound".

Hydrocarbon Series.—A group of hydrocarbon compounds which follow the same general law of molecular arrangement and composition, the arrangement following ring or chain order and the composition covering the proportion of the carbon to the hydrogen atoms.

Hydrocarbons, Saturated.—Hydrocarbon molecules which are unable to absorb more hydrogen atoms, such as the paraffine series.

Hydrocarbons, Unsaturated.—Hydrocarbon compounds which have the ability to absorb additional hydrogen than naturally existing in the compound. Thus the olefines or ethylenes are unsaturated hydrocarbons and form new compounds when additional hydrogen is supplied.

Hydrocarbon Valence.—The bond or tie between the carbon of the hydrocarbon compound. An expression of the "Valence" or attraction between the carbon atoms which holds the carbon constituents of the molecule in place. This is indicated graphically in molecule diagrams by one or more short parallel lines between the atoms. Thus, if the valence between two carbon atoms is 1.00, or unity, as in "Chain compounds of the paraffine type" then the single valence is indicated by single dashes as in C-C-C-C-C. If the valence is two, then the valence is shown graphically by C =C =C =C =C =C and so on.

Hydro Electric.—An electric power plant driven by water.

Hydrogen.—A gaseous element, the lightest known which is odorless tasteless and colorless. It combines with carbon in a great many proportions to form "Hydrocarbons."

Hydrogenize.—To introduce hydrogen into a compound, or to produce a chemical reaction in a compound by the introduction of hydrogen. Thus, hydrogenized oils, recent discoveries have made one barrel of gasoline from one barrel of petroleum. The Standard Oil Co., of New Jersey controls the rights for the United States of America.

Hydroline.—(B). This blown oil originated in Texas petroleum; it contained 99.6 per cent of bitumen soluble in carbon disulphide, 68 to 71 per cent of bitumen solution in 88° Be. naphtha 57 to 64 per cent of pure bitumen as saturated hydrocarbons, 1 per cent of paraffine scale, 0.41 to 0.56 per cent sulphur and 8.7 to 12.2 per cent of ash-free residual coke. It has been reported that "Hydroline B" was the same as byerlyte.

Hydrolysis.—The chemical decomposition of a compound caused by water, new compounds being formed. As an example, is the decomposition of calcium carbide to form acetylene.

Hydrometer.—An instrument used for determining the density of specific gravity of a fluid by the principle of flotation. The hydrometer is floated in the fluid and sinks to a greater or less depth, depending upon the density, the amount of submergence being indicated by graduations or divisions on the stem of the instrument. These divisions vary according to various systems, and may be marked according to the specific gravity Baume, or Twaddell density system of measurements. See: BAUME, and GRAVITY, SPECIFIC.

Hydrometer, Baume.—A hydrometer graduated in "Baume Degrees", or so that the hydrometer stands at division 10 when floating in pure water. See Baume; also gravity.

Hydrometer, Specific Gravity.—A hydrometer which indicates the specific gravity, or the relation of the weight of the given fluid per unit volume to the weight of a unit volume of water. Used for all fluids, oils included.

Hydrometer, Thermometric.—Hydrometer with any scale which is provided with a thermometer to take the temperature of the fluid at the same time that the density is measured. This is of importance, as the density of a fluid varies with the temperature.

Hydrometer, Twaddell.—A hydrometer used for liquids heavier than water, and marked with the Twaddell scale, which when multiplied by 0.005, gives the specific gravity.

Hydro-Oxy Oil Gas.—A process by which the illuminating value of an oil gas is increased by the addition of oxygen.

Hydrophilic.—Possessing a property whereby they take up water in conjunction with the molecules of the colloid in a manner analogous to a closed hydrated molecule. Hydrophilic colloids are valuable dispersing mediums for making emulsions.

Hydrostatic Pressure.—Developed within a porous rock is directly proportional to the depth of the superimposed column of fluid. In many fields containing several oil or gas sands it is found that the closed-in initial pressures increase with depth, and are proportional to the vertical depths below the outcrops of the strata in which the accumulations occur. The direct influence of the pressure of water, with which the rocks are saturated, is here evident. Thus, it has been found that an arbitrary rule to determine an approximation of the rock pressure is that which would be equal to a verticle column of water as deep as the well.

Hydrostatics.—That branch of physics which relates to the pressure and equilibrium of liquids. The principles of statics applied to water and other liquids.

Hydrothermal.—Heating water's that carry things in the earth's crust.

Hydrous.—Containing water chemically combined as in hydrates or hydroxides.

Hydroscopics.—Bodies which tend to absorb moisture from the air such as alcohol, sulphuric acid, and calcium chloride. When they absorb a sufficient amount of moisture to liquefy the material, they are said to be "Deliquescent".

Hygrostat, Psychrometer.—An instrument for determining the amount of moisture in the air or the relative humidity. It is also used to determine the "Dew Point" or point of saturation at which water is precipitated from the air. Such instruments are used in gas engine tests and in plants where drying processes are carried out as in drying lumber or fabrics.

Hygrometry.—The measurement of the percentage of moisture in the air or the "Relative Humidity" of the air. See: "Humidity, Relative". This is of importance in computing oil vapor and air mixtures since the absorption of oil vapor is affected somewhat by the moisture in the air, the moisture tending to displace the oil vapor.

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Ice-Machine Oil.—An oil of low cold-test, as, for example, the light, lubricating oils from Texas crudes. Light spindle oil of 26° to 27° Be. gravity, 60 to 100 sec. Saybolt viscosity at 70°F., 325° to 360°F., flash and 0° to 4°F., cold test, has also been recommended for refrigerating machines.

Ichthyol.—An oil obtained by the distillation and sulphonation of bituminous shales, afterwards neutralized with ammonia and salt. This oil is soluble in water.

Idlers.—Guide pulleys, gears or sprockets used in the support and guidance of belts, chains and ropes, or for communicating motion from the driver to the driven, the idler not being connected to a driving shaft. Idler pulleys and sprockets are also used for tightening belts or chains or to maintain a uniform tension in the strands of same. The idlers turn on their shaft not with it.

Idling.—Applied to an automobile engine when running slowly and without load. Clutch released. Engine may "Idle Well" or "Idle Poorly" according to whether it runs smoothly or irregularly at low speed with the load off.

Idling Jet.—A gasoline nozzle or jet placed in a carbureter for supplying gasoline when the engine is idling or running slowly. Found on compound carbureters.

Igneous or Eruptive Rocks.—Those rocks which have been ejected by eruption from the heated interior of the earth. Traces of bitumen or bituminous compounds are occassionally found in igneous rocks.

Ignition.—To light or inflame by raising a small portion of the substance to the point where it will start to combine with oxygen. To start combustion.

Ignition Apparatus.—Any apparatus or device used to ignite or to start combustion. The accepted meaning refers to the apparatus used for the ignition of the gaseous mixtures within the cylinders of internal combustion engines.

Ignition, Catalytic.—Ignition by means of a platinum wire or other metal which condenses hydrogen or hydrocarbons so strongly that they are ignited. Platinum and a few other rare metals possess the property of condensing hydrogen so quickly when placed in contact with the metal that the latent heat liberated brings the temperature of the metal up to the ignition temperature of the gas (Red hot). This effect is increased when the metal is covered with platinum black. This has been the basis of many patented cigar and gas lighters.

Ignition, Compression.—Ignition of the fuel in internal combustion engine (Diesel Type) in which the air is compressed to such a pressure that the heat liberated is of sufficient intensity to ignite the fuel. See: Diesel Engine.

Ignition, Electric.—Ingition of the charge of an internal combustion engine by the heating effect of an electric current, the heat being produced by an electric spark or by a hot wire electrically heated. The latter method is no longer used.

Ignition, Flame.—An old system of engine ignition, now seldom if ever used, in which flame is drawn into or injected into the combustion chamber of the engine. This was used on the early Otto and Lenoir engines.

Ignition, High Tension Electric.—An electric ignition system in which a high tension current (10,000 to 20,000 volts) is made to jump between two spark points or electrodes and produce an electric spark in the midst of the combustible mixture. This is the system mostly in use today on automobile, aeroplane and similar gasoline engines. Either batteries with spark coils or high tension magnetos supply the current.

Ignition, Hot Bulb.—A system used in some low compression oil engines in which a portion of the combustion chamber is left without water jacket thus allowing the walls to become red hot. Oil is injected into the chamber at the end of the compression stroke and on striking the hot walls, and by the combined effect of the compression temperature, the oil is ignited. Improperly called a "Semi-Diesel Engine".

Ignition, Hot Tube.—A system formerly much used on stationary gas and gasoline engines in which the combustible mixture is forced up into the interior of the red hot tube at the end of the compression stroke. On making contact with the hot tube the gases are ignited. While very simple, this has also many faults such as the burning out of the tube, misfiring due to decreasing compression, etc.

Ignition Lag.—The amount by which the actual time of ignition lags behind the time when the spark timer is actuated.

Ignition (Low Tension).—An electric ignition system, sometimes used on low speed engine in which a spark is produced within the cylinder by "Breaking" a low tension current (Low voltage). A coil included in the battery circuit provides "Inductance" to increase the intensity of the flash when the jaws of the breaker are separated. This means that moving parts must be included within the cylinder, a feature not desirable, particularly with high speed engines.

Ignition (Make and Break).—See: Ignition, Low Tension. A low tension system in which a battery or magneto current is alternately made and broken inside of the combustion chamber of the engine, a spark being produced at each "Break".

Ignition, Magneto.—An electric ignition system in which the current is produced by a "Magneto" or a special dynamo. If this magneto produces only low voltage current it is a "Low Tension Magneto System". If a high tension voltage is generated directly within the magneto it is called a "High Tension Magneto System".

Ignition, Preignition, Premature Ignition.—A condition in which the mixture is ignited too early in the compression stroke or prematurely. This may be caused by defective ignition apparatus, by an overheated mixture due to carbon or incandescent metal in the compression chamber. Preignition causes pounding and excessive stress on the engine. It tends to reserve rotation, and will reserve it if the speed drops down low enough. This results in power loss and overheating as well.

Illuminating Gas.—Gas which has a sufficient hydrocarbon content to burn with a luminous flame from an open jet. This hydrocarbon content may be inherent with the gas as with oil gas or retort coal gas, or it may be introduced in the form of an oil vapor as in the case of carbureted water gas.

Illuminating Oils.—Illuminating oils are the oils used with wick lamps such as kerosene oil, seal oil. Kerosene is the most commonly used grade of mineral oil, and is the next fraction following gasoline in the distillation of petroleum. Almost any oil is illuminating oil if burned under the proper conditions, but in practice this only applies to those oils which can be safely used with wick lamps, and where the flame itself provides the illumination.

Immiscible.—Not capable of mixing as oil and water.

Impalpable.—Extremely fine, so that no grit can be perceived by touch.

Impervious.—Impassable; applied to strata such as clays, shales, etc., which will not permit of the penetration of water, petroleum or natural gas.

Imposite.—An asphalt somewhat similar to Albertite but is not soluble in turpentine.

Impregnated.—Said of rock or other body, the pores of which are more or less filled with extraneous materials, such as oil or tar.

Impregnating Compounds.—Compounds which are used for waterproofing or to increase the strength or resistance to wear, these compounds being forced into the pores of such materials as wood, fabrics, or stone. Electrical impregnating compounds are used to increase the electrical resistance of certain porous materials and to keep out the moisture which would cause internal short circuits. Timber is impregnated with creosote to preserve the wood against decay and insects.

Impsonite.—An asphalt found in Oklahoma much like albertite but almost insoluble in turpentine.

Incrustation.—A deposit left on the surface by the evaporation of a liquid or by deposit from a liquid; as, for example, the crust left in a boiler by the evaporation of water.

Incubator Oil.—An illuminating oil possessing a gravity of 48 and a fire test of 150°F. Such an oil should be low in cold test and burn a lamp out dry with as little as possible diminution of flame or charring of wick.

Index of Refraction.—A number which expresses the ratio of the sine of the angle of incidences to the sine of the angle of refraction.

Indicated Horsepower.—The horsepower actually calculated from the indicator card and representing work done inside the cylinder which is more or less than done at the pulley of a machine; (In case of an engine it is more, but in that of a belted compressor it is less) by the amount of mechanical friction of the machine.

Indications.—Substances found on the earth's surface by which the occurance of petroleum may be inferred. They include asphaltum, natural gas, films of oil, etc.

Indicator.—An instrument used for drawing a graphical diagram of the pressure distribution in the cylinder of a heat engine. It is by this instrument that we can tell whether ignition, compression or expansion are taking place properly, whether the valves are opening or closing at the proper time, and by which the internal or indicated power of the engine can be calculated. Any instrument which shows numerical values of physical qualities.

Indicator Card.—The pressure volume graph or diagram traced by an engine indicator which shows the pressure distribution within the cylinder and which affords a means of computing the horsepower developed within the cylinder.

Induction Motor.—An alternating electric motor in which there is no direct connection between the supply mains and the rotating "Rotor". The current in the rotor is "Induced" by the magnetic field of the stationary portion.

Inflammable.—Easily set on fire; as, an inflammable gas.

Initial Boiling Point.—In a standard laboratory distillation, the temperature on the distillation thermometer at which the first drop of distillate falls from thte condenser.

Initial Daily Production.—Number of barrels of oil yielded by a new well during the first twenty-four hours after having been put in proper condition for pumping or flowing.

Injected Gas.—The gas put into an oil-producing sand for the purpose of maintaining or restoring rock (formation) pressure, or for storage.

Injector.—Mechanism used for spraying fuel oil into the combustion chamber, feeding water into steam boilers, or as a pump for exhausting gases from shale furnaces.

Insect Oil.—An non-viscous neutral oil of the same grade as concrete form oil or paint oil.

Inspissation.—Evaporation of the lighter constituents of petroleum, leaving the heavier residue behind, as in the formation of asphalt rock.

Intermediate Oils.—The specific gravities of these distillates from shale oil vary from 0.84 to 0.87; they are used for gas-making and at 800° to 900° C. a good Scottish intermediate oil will yield 1,200 c. p. per gallon.

Internal Combustion.—Pertaining to any engine in which the heat or pressure energy necessary to produce motion is developed in the engine cylinder, as by the explosion of gas.

Internal Combustion Engine.—An engine which operates by means of combustion of fuel within its cylinder such as gas, gasoline, oil, etc.

Interval.—The perpendicular distance between two parallel lines, as for example contour lines.

Inversion.—The folding back of strata upon themselves as by the overturning of a fold in such a manner that the order of succession appears to reverse.

Iodine Monochloride.—A solution used for determining the iodine value of an oil.

Iodine Value.—The percentage of iodine absorbed by an oil, or the number of grams of iodine absorbed by 100 grams of oil. Iodine value is the indication of the tendency of a fixed oil toward oxidization, since iodine quickly combines with those ingredients in a fixed oil which have a tendency to oxidize.

Ionite.—A fossil hydrocarbon found in a more or less impure condition in the lignite of Ione Valley, Amador Co., Calif., it has a brownish yellow color and, while only partially soluble in alcohol, is completely dissolved by chloroform; it yields a brown tarry oil on destructive distillation.

Iridescence.—The exhibition of prismatic colors in the interior or on the surface of a mineral.

Isoclinal Fold.—A stratigraphic fold whose sides have parallel dips; it may be an anticline or a syncline, and may be either vertical, overturned or forced over into an oblique position, or recumbent, that is pushed over into nearly or quite a horizontal position.

Isoclinal, Isoclinic.—Dipping in the same direction, hence, an isocline.

Isocline.—A series of isoclinal strata. An anticline or syncline so closely folded that the rock beds of the two sides of limbs have the same dip.

Isogenic Lines.—Imaginary lines joining places on the earth's surface at which the variation of the magnetic needle from the meridian or true north is the same.

Isomeric.—Composed of the same elements united in the same proportion by weight, but differing in one or more properties owing to the difference in structure.

Isothermal.—At constant temperature. When a gas is expanded or compressed at a constant temperature, the expansion or compression is said to be "Isothermal".

Isothermal Line.—The line indicating the relation between the pressure and volume of gas due to expansion or compression at a constant temperature.

Ixolyte.—An amorphous, hyacinth-red greasy hydrocarbon mineral which softens at 76° C., it is found near Oberhart, near Gloggnite, Austria.

J

Jack.—A mechanical device for the purpose of lifting a heavy load as a pump jack lifts the load due to pumping, or a screw jack used manually to lift heavy structures, or to move same.

Jack Boards.—Braces used to support pipe jacks.

Jack Post.—A support for the main bearings of the Band-wheel shaft.

Jack and Circle.—The apparatus, consisting of a powerful jack and a steel-toothed circle on which the jack moves, used to tighten the joints in a string of tools.

Jack Latch.—A fishing tool.

Jack Shaft.—A short shaft set between two machines to provide means for increased or decreased speed or for flexibility.

Jacket.—An annular space surrounding a cylinder by which the cylinder is cooled or warmed by the flow of water or steam through the space. A water jacket is placed around the cylinder of a water cooled engine while a steam jacket surrounds the cylinder of a steam engine.

Jamin Effect.—The resistance offered to flow by alternating globules of liquid and bubbles of gas in channels of capillary dimensions. A term much used in discussions of oil extraction from the sand or natural reservoir.

Jar.—To drill by impact, as a rock.

Jar Socket.—A fishing tool.

Jars.—In well drilling a connection between the drill stem and rope socket when drilling. Links allowing rebounds, flexibility. Jars are used at the top of the stem when drilling but at the bottom of same when fishing.

Jat System.—An automatic control system using electrically operated valves to flow wells intermittently.

Jerk Line.—A line which connects the band wheel crank to the drilling cable and which does the jerking, and thus operates the spudding tools.

Jet.—A very black, lustrous solid used as an ornament for dresses, etc., and made from a variety of lignites. A nozzle or orifice arranged for the efflux of a fluid. Thus a CARBURETER JET is the nozzle through which the liquid gasoline sprays into the carburetor. A stream of fluid.

Jet Black.—A name for lampblack.

Jet Pump.—A pump which moves fluid by bringing it in contact with a rapidly moving stream of a fluid of the same or different kind the motion being imparted through friction. Injectors and aspirators are pumps of this type.

Jew's Pitch.—A name to a semi-solid form of bitumen formerly used for medical purposes.

Jig.—In well boring, to drill with a spring pole. A form used by manufacturers to duplicate a piece of a machine as it is being machined. An apparatus used in ore concentrators.

Joch or Jock.—A Polish measure equal to 1.42 acres.

Jockey Stick.—A wooden rod extending from the headache post to the wire line drilling clamps, to keep the clamps from turning during drilling of a pipe usually 1 inch in diameter and 8 feet long. One end is fastened to the clamps; the other is hinged on the headache post by running it through a post. As the wire line rises and falls the jockey stick rides back and forth through the 2 inch pipe with a slight up and down motion.

Joint.—In drilling, that part of a drilling or fishing tool by which connection is made with another member of the string. A complete joint consists of a threaded truncated cone, the pin and corresponding coupling also a single piece of pipe or tubing usually about 22 feet in length.

Jolly Balance.—A very delicate spring balance used especially for the determination of densities by the method of weighing in water and air.

Joule.—A unit of work or energy which is equivalent to the energy expended in one second by an electric current of one ampere in a resistance of one ohm. Approximately equivalent to 0.738 foot-pound. The gram degree centigrade thermal unit; the small calorie.

Joule's Law.—The law that there is no change of temperature when a gas expands without doing external work and without receiving or rejecting heat.

Journal.—That part of a rotating shaft which rests and rubs in the bearings. The bearings are thus often called the "Journal Boxes". The bearing part of a shaft.

Jump Spark System.—See: Ignition, High Tension System.

Jumping a Claim.—Taking possession of a mine or claim by stealth, fraud, or force.

K

Kabaite.—A hydrocarbon related to ozokerite, found in meteorites.

Kelp Oil.—Oil obtained by the distillation of dried kelp. It is rich in nitrogen.

Kerites.—Natural solid asphaltic pyrobitumens composed for the most part of kerotenes. (e. g. wurtzilite and albertite).

Kerogen.—A term applied to the bituminous material in Scottish oil-shale; upon destructive distillation of the shale, kerogen gives rise to crude shale oil.

Keroles.—Those portions of kerotenes which are soluble in pyridin but insoluble in chloroform.

Kerols.—See Keroles.

Kerosene.—Illuminating oil. A mixture of hydrocarbons, freed on the one hand from gasoline or naphtha on the other hand from the heavy hydrocarbons that belong to gas oil and lubricating oil. It is obtained from petroleum oils; the range of gravity Baume may be from 48 to 56. There is quite a variation in specifications by different authors, some of whom, give gravities as low as 45° and as high as 57° Be. Colors range from straw to white.

Kerosene Engine.—An internal combustion engine using kerosene or kerosene distillate as a fuel. The kerosene may either be vaporized in a special heated carburetor or it may be injected directly into the combustion chamber in the form of a spray at the end of the compression stroke.

Kerosene Shale.—This term may be applied to any bituminous or oil shale from which illuminating oil has been or may be obtained. The term is specifically applied.

Kerosene Distillate, Kerosene Stock.—This product follows the light end or engine distillate, and varies in color, reaction to "doctor", burning quality, flash, etc., according to the nature of the crude. Burning oil stock. "Burning oil distillate". In California practice, a product having an amber color and a gravity of 40° to 42° Be.

Kersolene.—A mixture of hydrocarbons from coal or albertite oil, equivalent to petroleum ether, possessing a boiling point of 90°F; it was proposed by Bigelow as an agent for producing anesthesia by inhalation.

Kerotenes.—Those portions of bitumens, asphaltic pyrobitumens or pyrobitumens which are insoluble in carbon bisulphide.

Key.—A kind of wrench used for screwing and unscrewing drill rods. Also used to support the rods by resting on top of the casing and allowing the rods to hang by the enlarged joint coming in contact with the key.

Key Rock.—A stratum so persistent and identifiable over large areas as to be valuable in deciphering structure, such as Chattanooga shale, Pittsburgh coal, etc. A study from samples taken with diamond core drills reveals a key rock, and by making soundings in a number of places a cross section of a structure may be determined.

Key Sealing.—In drilling, vertical channeling of the walls of a hole. In machine work, groove in the hub of a pulley are key seats for the purpose of attaching the pulley to the shaft. The act of cutting a key seat.

Kilogram.—A unit of weight in the metric system, and equal to 1000 grams or 2.2046 pounds avoirdupoise.

Kilogram-Calorie.—A metric unit of heat quantity comparable with the B. T. U. The Kilogram-Calorie is the amount of heat required to raise one kilogram of water one degree centigrade. See: Metric System of weights and measures in any mechanical engineering hand book.

Kilometer.—A length of 1000 meters, equal to 3280.8 feet or 0.621 mile. A little less than ⅝ mile.

Kilo-Volt Ampere.—A power rating of alternating current electric machinery, and is one kilowatt at unity (1.00) power factor.

Kilos.—A metric weight, 1,000 equals one metric ton; 1,016 equals one long ton.

Kilowatt.—A unit of power equal to 1,000 watts. The equivalent, when at the proper rate, of 1.34 horsepower, or a quantity of electricity called one ampere having a potential force of one thousand volts, or it may be composed of any factors partly amperes and partly volts which multiplied is equal to 1,000.

Knife Edge Structure.—The knife edge structure near Tuxpan in the State of Vera Cruz, Mexico. Tamasopo Ridge, and Golden Land structure are other names applied to it; extends more than 50 miles in a general north and south direction, a great amount of petroleum has been taken from it.

Knock Off Joint.—A joint used to disconnect the rod line from the pumping power, when a well has been "pumped off" there is no need to continue to operate the pump, but the central power must run on to pump other wells, and provision of a knock off joint, also called "hook off" is necessary to disconnect the line.

Knock Off Block.—Used to fasten lines when they are disconnected from the plant. This block placed between the knock off joint and a post holds a tension upon the rod line to the pumping jack, and thus prevents the Sucker-rods at the well from pulling the jack and pull rods so far that the well cannot be hooked on again.

Knock Stick.—This useful bit of drilling equipment which does not appear in the oil field supply catalogs is a short club commonly a piece of pick handle used to knock the "T" screw on the yoke at the lower end of the temper screw while the walking beam is in motion.

The purpose of the wallop is to tighten or loosen the yoke on the main screw.

Koku.—(Japan) Equal to one-tenth of a ton.

Konlite.—A reddish brown to yellow, soft, amorphous hydrocarbon mineral which has a specific gravity of 0.88, a melting point of 114° C., and distils at 200° C.

Kosmos Burner.—A burner for testing the candle power of illuminating oils.

Krantzite.—A sectile, somewhat elastic yellow resin, which possesses a specific gravity of 0.968 fuses at 225° C., and whose composition corresponds nearly to the formula C_{40} H_{64} O_4.

Kutter's Formula.—A formula for estimating the flow of water in rivers and canals, and sometimes modified for estimating the flow through long pipes with low velocity and entrance head.

L

Laccolith, Laccolite.—A mass of intrusive igneous rock of approximately circular outline and lenticular cross-section, with a flat base, which has been forced between strata so as to raise the overlying beds in the form of a dome.

Lacquer.—A very transparent form of varnish used for the protection of polished metal surfaces.

Laid Length.—The length measured after pipe is placed in position. It includes such items as gaskets or space between ends of pipe in coupling or the insertion of bell and spigot joint or the central ring of C. J. HUB.

Lake Pitch.—Asphalt from the Pitch Lake, Trinidad. It is richer than the land pitch in bituminous matter; soluble in petroleum spirit.

Laminae.—The thinnest separable layers or sheets in stratified rocks, whether original planes or decomposition, parallel or oblique to the general stratification, or in rarer usages, planes of cleavage transverse to stratification.

Laminated.—Thin layers of rocks one upon the other. Produced in layers as is laminated steel for gun barrels.

Lamination.—Fine sedimentation planes within strata.

Lamp.—Any device employing a flame, incandescent wire or the like, for furnishing an artificial light, or a similar device for heating as in laboratory use.

Lampblack.—A product obtained directly from natural gas by burning the latter under plates or rolls with insufficient oxygen. See: Carbon Black, and Gas Black.

Lamp Burning Test.—A test for illuminating oils in which the oil is burned in a standard lamp under standard conditions.

Lamp, Harcourt Standard Pentane.—A standard lamp used in Europe (except Germany), for determining candle power. Pentane is used as the illuminant.

Lamp, Hefner.—A standard lamp for determining candle power in which amylacetate is used.

Lamp Oil.—Illuminating oils and kerosene.

Land.—To definitely fix the casing at a given depth in the hole. The name of real property including real estate buildings, etc.

Land Asphalt.—An inferior asphalt containing various impurities and lacking cementing qualities; from places outside of the Trinidad asphalt lake.

Lanoline.—Purified degree (Sheep's wool Oil) with the addition of about 25 per cent of water.

Lard.—Fat of swine.

Lard Oil.—Oil expressed from lard. Used mostly as a cutting and cooling oil for metal working tools and for compounding with mineral oils.

Latch Jack.—A fishing tool designed to catch the bail of a bailer (sands).

Latent Heat.—The thermal equivalent of the energy expended in melting a unit mass of a solid or vaporizing a unit mass of a liquid; or conversely, the thermal equivalent of energy set free in the process of solidification or liquefaction.

Latent Heat of Vaporization.—The quantity of heat required for converting a fluid into a vapor at a constant temperature called the "Boiling Point." The latent heat of vaporization, given as B. T. U., or calories, is the heat energy required for breaking up the liquid state and setting the molecules in such an amplitude of virbation that the different equillibrium between the molecules actually becomes a molecular repulsion. During the process of vaporization the temperature remains constant.

Lateral.—Belonging to the sides or to one side. A branch to pipe line or an irrigation canal.

Law of Mass Action.—The law that the chemical action of a reacting substance is proportional at any moment to its active mass.

Law of Superposition.—The law underlying strata must be older than overlying strata where there has been neither inversion nor overthrust. Upon this law all geological chronology is based.

Lawrence Condenser.—Used in the refining of petroleum. Consists of a flat box formed of two sheets of corrugated metal placed close together and joined at the edges.

Lay.—The direction or twist of the wires and strands composing a rope.

Layer.—A bed or stratum of rock.

Lazy Bench.—The bench to one side of the derrick floor used for visitors and workmen to rest while observing the operation of drilling.

Lea Recorder.—A recording flow meter for water of the "Vee Notch" type which records the flow on a paper chart.

Lead Acetate, Sugar of Lead.—A poisonous white crystalline salt of lead used in disulphurizing.

Lead Hydroxide, Lead Hydrate.—A lead used in petroleum refining.

Leaf Coal.—Leaf coal or foliated coal, is a lignite formed of super imposed layers; Westwald Leaf-Coal contains 62.8 per cent of carbon, 6.7 per cent of hydrogen, 17.3 of oxygen and nitrogen, 11 per cent of ash and 24.6 per cent of water.

Leaf Shale.—The products of the distillation of leaf-shale are as follows:

Tar, specific gravity	0.88 to 0.93	2 to 25%
Crude distillate, specific gravity.....	0.70 to 0.85	0.10 to 6%
Crude distillate, specific gravity	0.85 to 90	3 to 12%
Crude paraffin		0.25 to 1%

Lease.—A contract for the possession and profits of lands for a determinate period in consideration of a recompense of rent. The instrument by which such grant is made. A piece of land leased for mining purposes. A legal document executed between the land owner as lessor and another party as lessee, granting the right to exploit the premises for mineral or other products.

Lease, Block Method.—A lease on oil land in which the royalty is arranged on a sliding scale basis, a fixed rate of royalty being paid on all oil produced up to a certain output, and after a lower rate for all production in excess of this amount.

Lease Method.—A method of leasing oil lands whereby a fixed royalty rate on all oil produced up to a certain amount is called for after which a lower rate is charged.

Lease, Period Method.—A method in which the royalty rate is based on the production of the well per unit of time (usually in barrels per day) and the rate is changed when the well produces less than the stipulated amount.

Lease Power.—A power plant upon an oil producing property which operates one or more oil producing wells. At each well is a pumping jack connected by means of shackle line or rod line to an eccentric, attached to a band wheel, revolved by motive power.

Leasehold.—The legal estate in land granted by lessor in favor of lessee.

Leather Oil.—An oil used for softening leather. Neatsfoot oil (Animal) is excellent, but a non-viscous neutral mineral oil of low viscosity can also be used.

Leathers, Hydraulic Packing.—Leather rings of "U" shaped section placed around the plungers of high pressure hydraulic pressure of pumps. The pressure acting inside of the "U" forces the leather tightly against the surfaces, the higher the pressure the tighter the packing becomes.

Left Regular Lay Cable.—A cable with individual wires laid to form strands, and strands laid to the left to form cables.

Legs.—The two sides or wings of saddle reef or anticline. Members of a derrick.

Lensing.—A thickening of the bed, causing a variation in the stratigraphic interval.

Lenticular.—Shaped approximately like a double convex lens. When a mass of rock thins out from the center to a thin edge all around it is said to be lenticular in form.

Leptometer.—An especially constructed viscometer invented by Lepenau. It has two metallic cylinders placed side by side in a water bath and terminating below in stop cocks. Three sets of interchangeable jets are provided for attachment to the stop cocks. Standard oil is placed in one cylinder and oil to be tested in the other.

Lessee.—The one to whom the lease is granted.

Lessor.—The one who grants the lease.

Leucopetrite.—A substance between a resin and wax in character found in a brown coal at Gesterwitz near Weissenfels; it crystallizes in white needles from ether and boiling absolute alcohol, and melts about 100°C. It has the formula $C_{50}H_{84}O_2$.

Level.—An instrument used for determining points of equal elevation or differences in elevation. Of equal elevation or equal distance from the center of the earth; water is said to seek its level.

Libolite.—A kind of asphalt occurring near libollo in western Africa; it resembles albertite.

Lie Key.—A tool on which boring rods are hung when being raised or lowered in a borehole. (Not used in American practice).

Lift.—A word used in pumping. The difference in elevation between the surface of the liquid being pumped to the elevation at which it is discharged as in gas lift pumping. In drilling the vertical movement of the drilling tools.

Ligate Tar.—The destructive distillation of lignite produces a soft tar which can be used directly in a Diesel engine or which can be redistilled to obtain products somewhat similar to the distillates of coal tar. This tar usually contains large quantities of paraffine and unsaturated hydrocarbons, and, upon exposure, absorbs oxygen from the air. The distillates of lignite tar furnish motor fuels of mixed paraffine and aromatic base, illuminating oils, lubricating oils and paraffine wax. The lignite motor fuels are very similar to those obtained from oil shale.

Light Petroleum.—A petroleum product possessing a boiling point of 70 90° C., and a specific gravity of 0.650 - 0.666 (85 - 80° Be.) A solvent for fatty oils used for the carburetion of air in gas machines.

Light Slushing Oil.—A non-viscous neutral oil of the same grade as concrete form oil.

Lighthouse Oil.—The United States lighthouse establishment requires that mineral oil supplied for use in lighthouse lamps shall possess specific gravity of not less than 0.902, a flash point of not less than 140°F., and a fire test of not less than 154°F. In a fifth-order Hains lamp, the light is to be equal to that of eighteen sperm candle and is to continue undiminished during 5 hours burning.

Lignite.—A brownish-black coal in which the alteration of gegetal material has proceeded further than in past but not so far as in subbituminous coal. A mineral substance of vegetable origin like common coal, but differing from it in its more distinctly fibrous or woody formation. Under this name are comprised a number of substances which lie between peat on one side and bituminous coal on the other.

Lignite Oils.—Heavy lignite oils possess a specific gravity of 0.89 to 0.97, a faint odor of creosote, and usually a low viscosity. They dissolve to the extent of 20 to 60 per cent, when shaken with two volumes of cold ethyl alcohol.

Ligroin.—Name given to a special distillate obtained after benzine, similar to kerosene; but has a slightly higher boiling point.

Limb.—One of the two parts of an anticline or either side of the axis.

Lime Hydrated.—A fine powder obtained by "slacking" lime by the addition of water.

Lime, Quicklime.—A white or gray substance obtained by calcining (roasting) a natural rock known as limestone. It consists mainly of calcium oxide with which magnesium is also generally found. It is strong caustic and alkaline properties and is therefore often used to neutralize acids in petroleum refineries as in the case where the acidity of a distillate is to be eliminated after the acid treatment. The calcined lime is often called "Quicklime." This may be hydrated by the addition of water producing calcium hydrate of "Slacked Lime" when water is added to quick lime much heat is evolved.

Limestone.—The general name for sedimentary rocks composed essentially of calcium carbonate. The popular as well as the technical name for all rocks which are composed of whole, or to a large extent of carbonate of lime. Limestone oil-bearing formations contain from 10 to 30 per cent of their bulk in oil.

Limmer Asphalt.—Limmer rock contains 8.26 per cent of material soluble in carbon disulphide.

Line of Dip.—The line of greatest inclination of a stratum to the horizon.

Line Pipe.—Pipe made of steel and used in pipe lines through which oil, gas or water is conveyed from place to place. Line pipe is designed for high pressures 500 to 1000 pounds to the square inch working pressures are not uncommon.

Line-Shaft.—A main shaft used for the transmission of power in a mill or factory. This shaft may transmit power from the engine to the machine directly or through smaller auxiliary shafts called "Jack-Shafts" or "Counter-Shafts."

Line, Steel.—See drilling rope.

Liner.—A short string of casing. Sent down inside of well to hold sand from falling into bottom of well and at same time prevents oil from draining down and exposing sand. Keeps sand saturated and prevents formation of scale that would retard the flow of oil into the well. The oil may overflow the top or enter through perforations.

Liners, Bearing.—The small sheets of "Shims" placed between the halves of a split bearing for the adjustment of takeup of the bearing for wear. The soft metal lining of a bearing.

Link Belt.—A belt made of links. There are many designs of metal link belts for the transmission of power. Standard designs of links for chains in oil field drilling machines are two. They are designated by numbers 1030 and 1240 respectively.

Linseed Oil.—The vegetable oil made from flaxseed. Used as a vehicle for paints and varnishes. It is a drying oil. Not used as a lubricant.

Linseed Substitute.—A petroleum used as a substitute for the more expensive vegetable linseed oil.

Liquefaction of Gases.—A gas may be liquefied by subjecting it to pressure and then cooling it to its critical temperature. This is done commercially with ammonia gas, sulphur, dioxide and carbon dioxide in refrigerating plants, also extensively used in refineries and natural gasoline plants.

Liquefied Bituminous Material.—Bituminous material which shows a penetration at normal temperature, under a load of 50 grams applied for one second of more than 350.

Liquefied Gas.—A liquid produced from elements which under normal conditions as to temperature and pressure are in gaseous form. The increase of pressure and decrease of temperature can be carried far enough to liquefy gas.

Liquefied Petroleum Gas.—Liquefied condensates from natural gas or from casinghead gas of oil wells, made either by the compression or absorption process, alone, or blended with other petroleum products.

Liquid.—A form of matter in which there is indifferent relations between the molecules, the attraction and repulsion between the molecules being in a balanced state. Such matter will not retain any definite form without support and possesses the property of "flowing" when such support is removed.

Liquid Bituminous Material.—Bituminous material which shows a penetration at normal temperature under a load of 50 grams applied for 1 second of more than 350.

Liquid Flow.—The flow of liquids in generally given terms of gallons or cubic feet per minute. This depends upon the impressed pressure (unbalanced) the viscosity of the fluid, its temperature, the nature of the surfaces over which it flows and the shape of the orifice through which it passes. The flow may be experimentally determined by dams or "Weir," by "Vee Notches," by meters, or by a venturi tube.

Liquid Fuels.—The liquid fuels most frequently used are: Petroleum and refinery residues, shale oil, tar from the dry distillation of coal wood, the tar oils obtained by the distillation of coal tar, benzine, and denatured, methylated or wood alcohol.

Liquid Level Control.—A combined float-chamber and a control valve which can be attached to a vessel in such a manner that the level of the liquid is automatically controlled.

Liter.—Metric unit of liquid measure. A measure of capacity in the metric system, being a cubic decimeter, equal to 61.023 cubic inches or 0.890 Imperial quart, or 0.908 U. S. dry quart or 1.0567 U. S. liquid quarts. It is equal to 1 kilogram of water at maximum density.

Litharge.—Lead monoxide. Used as material for making tight joints in pipe fittings and as an active material for the plates of storage batteries. Protoxide of lead or plumbous oxide the lowest oxide of lead.

Litho Carbon.—A product obtained from bituminous limestone of Uvalde County, Texas. It has been used in varnish making and for insulating purposes.

Litholine.—A registered name for petroleum.

Lithologic.—Pertaining to lithology or the study of rocks. Anything of rock character.

Litmus Paper.—A paper dipped into a solution of litmus, and used to test solution in order to determine whether they are acid or alkaline. Acid turns it red; alkali turns it blue.

Live Steam.—Steam direct from the boiler having its full power of expansion, distinguished from exhaust steam, which has been deprived of its available energy.

Livered Oil.—Jelly-like oil.

Load Factor.—The load factor of a power plant is the ratio of the average power taken to the maximum power available at the engines. In other words it is the percentage of the total power absorbed by the average load.

Load Indicator.—An instrument used to indicate the load upon a line to the hoist in a derrick, a pull rod or a sucker rod of a pumping well.

Loading Racks.—Standpipes (pivoted) used for filling tank cars. An elevated walk with valves and connecting pipes to fill tank-cars from the top.

Lock Nut.—A nut placed on a parallel threaded portion of pipe at a joint in order to stop leaks by means of a grummet, gasket or packing. A nut so designed that it locks itself or another nut in place. There are several patented designs.

Locke Level.—A hand level for determining differences in elevation.

Locked Wire Rope.—A rope with a smooth cylindrical surface, the wires of which are drawn to such shape that each one interlocks with the other and the wires are disposed to concentric layers about a wire core instead of in strands. Particularly adapted for hauling and rope-transmission purposes.

Locomotive Type Boiler.—A boiler that is self contained and which has only one pass for the hot gas.

Log.—The detailed record of the rocks passed through in drilling. When accurate logs constitute a valuable source of information. A record of operation or test which records all the essential items for the purpose of reference such items as: Intervals of time; quantity; distance; observed conditions, etc.

Long Ton.—A ton of 2240 pounds avoirdupois. Equal to 1016.06 kilograms.

Look Box.—A device providing a glass window as means for petroleum still. It is placed between the condenser and the manifold through which the stream is diverted into power tanks.

Loom Oil.—A heavy spindle oil. The following viscous neutral oil is employed for heavy looms; gravity 31° Be., flash point 415° F., fire test 480° F., cold test 20° F. and Saybolt viscosity 210. A non viscous neutral oil possessing a gravity of 34.5° Be., a flash point of 340° F., a fire test of 400° F., a cold test of 20° F., and a Saybolt viscosity of 75, is, however, sometimes used on looms when a light oil is desired.

Lovibond Tintometer.—An instrument used for determining the color of refined petroleum oils, reading in Lovibond "Color" numbers.

Low Dip.—Dip of less than 5 per cent, which is best recorded as so many feet per mile.

Low Pressure Steam Turbines.—Steam turbines operated on the exhaust steam of steam engines or other steam pressures of a few pounds per square inch.

Lower Valve.—See: Standing Valve.

Lubricants.—A substance used to reduce rubbing friction and wear between rubbing surfaces. They may be fluid, semi-fluid or solid, as with lubricating oil, grease, and graphite respectively.

Lubricants, Colloidal.—A lubricant in which the main constituent is a very finely subdivided solid matter in a colloidal state, such as colloidal graphite. As a matter of fact nearly all lubricants are of a colloidal nature, consisting of minute particles floating in a liquid, but unless these particles are artificially introduced into a fluid they are not called by name. More particularly the term applies to an oil or water containing colloidal graphite suspended in solution.

Lubricating.—A technical term for filling a well with mud-laden fluid to stop gas flow. The liquid is introduced into a length of casing or a chamber arranged above the well with valves to close and allow it to feed against pressure as in a lubricator.

Lubricating Film.—The thin layer of oil or grease between the rubbing surfaces. This film may be considered as subdivided into a series of thin sheets or laminations parallel to the surface, each lamination shearing or sliding over the other when movement between surfaces takes place. The film clings to both surfaces, hence, opposite sides of the film are dragged in opposite directions, shearing the film at an almost infinite number of planes.

Lubricating Greases.—These lubricants, which are employed to some extent on account of their easy and, in some cases, economical application consist of solutions of lime-soaps or lime-alkali soaps in mineral oils; mixtures of wool-grease, tallow, alkali soaps, etc., with mineral oil, or, in the case of axle or wagon greases of lime-soaps, rosin oil, lignite tar, coal-tar oils, magnesium silicates (talcum), etc. See: Oildag.

Lubricating Oils.—In petroleum refining lubricating oils may be the distillates passing over after gas oils almost to the end of the distillation until still wax appears, also petroleum residue not rendered too sticky by asphalt or other resinous matter.

Lubrication, Force and Splash.—A system used with certain automobile engines, in which the oil is fed to the main bearings and wrist pins under pressure, the drip from these parts being thrown into the cylinders and camshaft bearings by splash. The splash and drip fall into the lower half of the crankcase where they are collected for recirculation. This is a compromise system, half force, half splash.

Lubrication, Gravity System.—A system in which oil is fed into the bearings from an elevated tank. This is also used as a central supply system for a number of engines or units in a power plant.

Lubrication, Hydrostatic.—A lubrication system for steam engine cylinders, the oil being forced into the steam pipe by the hydrostatic pressure of a column of water. The oil in the lubricator chamber is displaced by the weight of water condensed in a siphon coil, and floats up through the water into drops which then float into the steam line.

Lubricators, Mechanical.—A lubricator operated by means of a pump and provided with sight-fed glass; often made in multiple for several parts of a machine but connected from a central place by small pipes.

Lucas.—The name of a well known gusher struck at Spindletop near Beaumont, Texas, in January, 1901, at a depth of 1050 ft. This event marked the beginning of the greater oil industry of the U. S. of America. Captain Lucas drilled the well.

Lungmotor.—A trade name for a mechanical device for inducing respiration in cases of asphyxia, drowning, electrical shock, etc. It consists of two parallel cylinders with pistons externally connected so that a stroke in one direction exhausts the lungs through one cylinder while the other cylinder fills with air, oxygen, or both, and a stroke in the opposite direction inflates the lungs with the air or oxygen, and discharges the foul gases drawn from the lungs.

Lye.—A caustic potash solution obtained by leaching wood ashes. This is strongly alkaline and caustic.

M

Magnetometer.—A delicate instrument which depends upon the principle of electro-magnetism used in geophysical prospecting.

Magnesium.—(Mg.) A metallic element exceedingly light in weight, and inflammable. It forms alkaline oxides when burnt in air. This metal is the basis of flashlight powders and is one of the constituents of magnalium and duralumin.

Magruder Viscomimeter.—A plunger type viscosimeter.

Main Shaft.—In drilling, the band-wheel shaft. The large shaft of an engine, or of a mill.

Make & Break, Ignition.—An electric system of ignition used upon some gas or gasoline engines which depends upon alternately the completing and the breaking of an electric circuit.

Make & Break, Rotary.—A rotary machine designed to makeup and unmake screwed tool joints or casing.

Make Up.—To screw together, as drill pipe or a string of tools.

Making Hole.—The process of gaining depth in a drilling well.

Malleable Iron.—Cast iron made from pig iron of the proper kind, so treated as to render it capable of being bent or hammered to a limited extent without breaking, that is, to render it malleable. Its strength is above that of cast iron.

Maltha.—Name given to a variety of bitumen like pitch, intermediate between liquid petroleum and solid asphalt.

Malthenes.—Those constituents of bitumen (or pyrobitumen) which are soluble in volatile aromatic-free petroleum spirits. (sp. gr. 0.645.)

Manak.—A variety of bitumen found in Uvalde County, Texas.

Manifold.—A pipe header with numerous branches or outlets.

Man Hole.—A hole in a boiler for a man to enter through.

Manjak.—A natural bitumen found in the Barbados. The term is sometimes used to include gilsonite and its congeners, and ozokerite. Used in the manufacture of varnish. Spelled also Mankack.

Manograph.—An optical form of indicator used for determining the pressure distribution in high speed engine cylinders. A mirror mounted on a flexible diaphram causes a ray of light to trace a pressure diagram and can be used to obtain a photographic record or to show the cycles visually.

Manometer.—A pressure glass in which the pressure is indicated by the height of a liquid column supported by the gas. This column may be water, alcohol or mercury.

Manometer, Mercury.—A U-tube filled with mercury; the difference in the heights of the columns indicates the pressure.

Mansfield Oil Gas Producer.—An instrument designed to produce oil gas from any kind of oil or fat as well as from paraffin oils.

Mantle Burner.—A burner for illuminating consisting of a bunzen burner (blue flame) over which a thin cone of corium oxide or other highly refractive material is supported. This cone of "Mantle" becomes incandescent and provides the light, hence any gas may be used regardless of its illuminating value.

Manus Tester.—Instrument for determining the flashing point of petroleum.

Marietta Process.—An air pressure drive developed in the locality of Marietta, Ohio, supposed to be the first time such a method was effectively used to accelerate production of oil.

Marine Oil.—An illuminating oil used on ships. It is a refined petroleum distillate of high fire test (225° F) with a specific gravity averaging 0.840.

Marsh Gas.—Methane, CH_4. The chief constituent of plants in swamps. Not uncommonly misinterpreted as an indication of the presence of petroleum.

Mass.—The word mass is used in three ways. 1. To express an indefinite quantity. 2. As a quotient (weight divided by 32.16), and 3. As a measure of quantity of matter.

Massecuite.—The concentrated mass of crystals and molasses as it is discharged from a vacuum pan in the process of sugar manufacture. Much machinery requiring a variety of petroleum products in both field and factory is to be found in the sugar industry.

Mast.—A long pole or tube rising in a verticle position to support some member of a drilling or hoisting machine, a ship, or a derrick.

Mastic.—A mixture of bituminous material and fine mineral matter, suitably made for use in highway construction and for application in a heated condition. "Mastic" is prepared for use in paving by mixing hot asphalt-rock, ground to a fine powder, with such proportion of hot bitumen, similar to that contained in the natural rock, that the product contains about 15 per cent of bitumen and 85 per cent of limestone. "Gritted asphalt-mastic" is composed of the mastic already described, remelted fragments of limestone or sand. For use in preparing mastic, the bitumen extracted from Seyssel asphalt is stated to possess the desired qualities in the highest degree.

Mastic Asphalt.—Mastic melted and laid without rolling or compacting under pressure.

Mateson and Dresser Joint.—A combination point in which a Dresser leak clamp of special form is used to reinforce a Matheson joint. Its special advance is that it allows repair without shutting off the service pressure.

Matheson Joint.—A wrought pipe made by enlarging one end of the pipe to form a suitable lead recess, similar to the bell end of a cast iron pipe, and which received the male or spigot end of the next length. Practically the same style of a joint as used for cast iron pipe.

Matrix.—A binder for holding the aggregate or coarse stone together in asphaltic concrete or road bed construction.

Mazout, Mazut, Marsut, Masut.—A Russian petroleum product remaining after the distillation of benzine and kerosene. It is a brownish black liquid, and used largely as a fuel oil.

Mean.—Arithmetical.—The average value of a number of quantities obtained by adding the values of the quantities together and then dividing the sum by the number of quantities.

Mechanical Equivalent of Heat.—The conversion factor for transforming heat units into mechanical units of work. One B. T. U. equals 778 foot-pounds.

Medina.—Oil and gas producing sandstone of Middle Silurian formation which yields oil, chiefly in the Ontario province of Canada.

Melene.—Hydrocarbon isolated from American petroleum. Formula $C_{30}H_{60}$.

Mellite.—A rare mineral, also called "honeystone," which occurs in tetragonal crystals and modular masses of honey-yellow color in the Thuringian lignite beds; it is said to be an aluminum mellitate.

Mensicus.—The curved surface, either convex or concave, of a fluid in a tube.

Mercaptans.—Sulphur compounds, analogis to alcohols, in which sulphur has replaced oxygen. They are colorless liquids with a strong repulsive odor like garlic.

Mercury.—Hg. an element, a very bright white metal fluid at ordinary temperature, used extensively in instruments of the oil industry, such as thermometers, barometers, U tubes, gages, etc.

Mesitylene.—An isomer of cumene was isolated by Lachowics from Halican oil by Engler from the petroleums of America.

Meta.—A prefix denoting a form of certain inorganic acids derived from the ortho, name the prefix is attached.

Metamorphic.—Changes in rock induced by pressure, heat and the action of water.

Metamorphism.—Any change in the texture or composition of a rock, after its induration or solidification, produced by exterior agencies, especially by deformation and by rise of temperature. The processes and results of cementation and of weathering are not ordinarily included. The most important agents are heat, moisture and pressure.

Meter.—An instrument for measuring and recording the volumes of gases and liquids. The metric unit of length. One meter equals 39.37 inches.

Meter.—Proportional Gas.—A meter which automatically measures a proportional part of the volume which flows through it.

Meter, Orifice.—A meter which employs the differential pressure on either side of an orifice to obtain a factor with which to calculate the quantity of flow.

Meter, Venturi.—A meter which employs a venturi tube to determine the factor for use in calculating the flow.

Methane.—$C H_4$ Marshgas, methylhydride, fire damp. The simplest saturated hydrocarbon a colorless, inflammable gas, slightly soluble in water or alcohol. It is one of the chief constituents of illuminating gas and is formed during the decomposition of organic matter.

Methanol.—$C H_4O$. Methyl alcohol, wood alcohol. A colorless liquid; inflammable, soluble in water alcohol, or ether. It is used as a solvent in place of alcohol (ethanol) for varnishes, paints, organic compounds, as fuel, in manufacturing of formaldehyde, in organic synthesis and for denaturing alcohol.

Methyl Alcohol.—Same as Methanol.

Methyl Chloride.—CH_3C_1. Used as a solvent and as a refrigerating medium for small cooling and ice plants.

Metric System.—A system of weights and measures depending upon the meter, in which the original factors are derived from the meter. The system includes measures of length, of which the meter is the unit; measures of surface, of which the meter is the unit; measures of capacity of which the liter is the unit; and weights, of which the gram is the unit. The subsidiary units of each primary unit. It is a question if the system will ever replace the yard, foot and inch in America.

Metric Ton.—2204.6 lbs. av., equals .9842 long ton. To find the number of gallons in a long ton, divide 224 by the specific gravity. of the oil, and in the case of a metric ton divide 220.46 by the specific gravity of the oil. 1000 Kilograms equals 2204.6 av. lbs.

Mexican Fluxes.—Contain a large percentage of sulphur, yields a high ash-free residual coke, contains 2 per cent or more of hard paraffin scale, which only 80 per cent of it is soluble in 88° Be., naphtha, as compared to over 90 per cent in the case of the other residuals.

Mica.—A transparent mineral occurring in thin sheets or laminations. Used as an electrical insulator and in some cases as a base for greases.

Micrometer.—An instrument by which exceedingly minute measurements may be made. The machinists micrometer is graduated to read measurements to the thousandth part of an inch.

Migration.—The movement of oil or gas through the pores of the rock. The rate of movement varies with the permeability of the rock, the viscosity of the oil, and other factors. Migration is essential to accumulation, but the distance which the oil may travel and the effect of migration on the oil itself are not well known. Movement of oil or gas is increased by methods employed by man in its recovery.

Mine Machine Oil.—A non-viscous neutral oil of the same grade as concrete form oil of black lubricating oil of 15°F. cold test.

Mineral.—The term mineral, when employed in a conveyance is understood to include every inorganic substance that can be extracted from the earth for profit, whether it be solid, as rock, fire clay, the various metals and coal; or fluid as mineral waters, petroleum and gas.

Mineral Burning Oil.—Oils suitable for burning with a wick, e.g., belmontine oil, kerosene oil, colzarine oil, mineral seal oil and pyronaphtha.

Mineral Caoutchouc.—A variety of bitumen resembling india-rubber in its softness and elasticity.

Mineral Gelatine.—A base for castor machine oils.

Mineral Glycerine.—A name for liquid petrolatum.

Mineral Land.—Land more valuable for its deposits as mineral, than for agriculture.

Mineral Oil.—Crude petroleum and its products.

Mineral Oil, Naphtha.—A limpid or yellowish liquid, lighter than water, and consisting of hydrocarbons. Petroleum is heavier than naphtha, and dark greenish in color when crude. Both exude from the rocks; but naphtha can be distilled from petroleum.

Mineral Pitch.—Asphaltum.

Mineral Resin.—Any one of certain mineral hydrocarbons as asphalt and bitumen. A term applied to the solid bitumens.

Mineral Right.—The ownership of the minerals under given surface with the right to enter thereon, mine, and remove them. It may be separated from the surface ownership, but if it is not so separated by distinct conveyance, the latter includes it.

Mineral Seal Oil.—A cut between kerosene distillate and gas oil, widely used as a solvent oil in gasoline absorption processes. It is used largely in signal lamps and for light house illumination, and in head lights of old style locomotives, has a gravity of 38.5° to 39° Be., viscosity of 45 to 50 at 100°F., on a Saybolt universal instrument.

Mineral Tar.—A viscoid variety of petroleum.

Mineral Wax.—See: Ozokerite.

Miner's Inch.—The miner's inch of water is accepted to mean the quantity of water that will escape from an aperture 1 inch square through a 2 inch plank, with a steady flow of water standing 6 inches above the top of the escape aperture, the quantity so discharged amounting to 2274 cubic feet in 24 hours. Inasmuch as the miner's inch is a local term, the flow of water shall be expressed in cubic feet per second, and where it is desirable for local reasons to use the term "miners" inch, it shall represent a flow of 1½ cubic feet per minute.

Miners' Oil.—This term is usually applied to a neutral oil of the same grade as paint oil. 66° to 68° Be. gasoline is used in safety gasoline lamps; sperm oil or a mixture of 60 per cent of sperm oil and 40 per cent of mineral seal oil is employed in safety oil lamps. "Compounded miners' oil" may consist of the grade described as paint oil or as mineral seal oil, compounded with either cottonseed oil or refined white fish oil. Such oil must possess a good cold test.

Miner's Sunshine.—A soft grade of parraffin wax with a melting point of 118° to 120°F. used by miners for burning in lamps.

Mingo.—Oil producing county of West Virginia.

Minseed Oil.—A bloomless petroleum product, used in connection with linseed oil for cheapening purposes.

Mississippi Lime.—In the Mid-Continent Field, the limestone just below the Pennsylvania series. Some confusion arises by applying it both to the black lime and to the stratigraphically underlying white lime. It was formerly believed that there was no use drilling into the Mississippi lime, but it is now certain that there are possibilities in these and lower beds.

Mix, in Cold Settling.—A solution of filtered stock in naphtha, so proportioned the amorphous wax originally present in the stock will be largely precipitated at the refrigeration temperature employed.

Mixing Oils.—Mixing oils are prepared in Russia from solar oil distillate, the fractions of a lower specific gravity than 0.860 being rejected, and only those possessing a gravity between the figure and 0.885 being employed. The principal use of such oils is said to be in the manufacture of artificial olive oil.

Mixture.—A commingling in which the ingredients retain their individual properties or separate chemical nature; if chemically combined it is a compound.

Moh Scale.—A scale of hardness for abrasives, measurements being taken by scratch comparison. Talc being taken as 1, and diamond 10 on the scale. Some other materials have the following hardness on this scale Barite 3. to 3.5, Silica 7, Topaz 8.

Molecule.—The smallest part of a substance that can exist separately and still retain its composition and characteristic properties;

the smallest combination of atoms that will form a given chemical compound.

Molecular Weight.—The molecular weight of a compound is equal to the sum of the weights of the atoms in that molecule, the relative weight of the hydrogen atom being taken as unity. By the use of the molecule weight we are enabled to determine the weights of the various substances entering into a compound. For example, we can determine the theoretical amount of air required to burn a pound of a given hydrocarbon compound.

Momentum.—The quantity of motion or the energy of motion.

Mond Gas.—A variety of semi-water gas, having typically a calorific value of about as a monoclinal ridge; a monoclinal flexure. Sometimes improperly called uniclinal.

Mond Fuel Gas.—A producer gas made from low grade coals and lignites, the generation of the gas being so controlled that the various by-products are retained.

Monkey Wrench.—An adjustable wrench which can be made to fit any nut within the range of its capacity.

Monoclinal Bulge.—Domes that rise with apparently irregular spacing on a monoclinal slope.

Monocline.—Name given in geology to strata which dip in the same direction. Oil is mostly obtained from anticlinal structures, but oil may also be obtained from monoclines, often in great quantity.

Montan Wax.—This wax, used principally as a carnauba wax substitute in the manufacture of polishes and as an insulating material in place of ceresin, was first prepared by Von Boyen from the bitumen extracted from dried Thuringian lignite by means of volatile solvents or from freshly mined lignite by treatment with superheated steam.

Montanin Wax.—A product resembling Montan wax but differing in its physical properties.

Moor Coal.—Moor Coal shows no woodlike structure, and has a flat conchoidal fracture. It is usually soft and friable, but is occasionally hard and slatelike. In color it varies between dark brown and pitch; hardness 2.5. It frequently contains remains of marsh plants. Moor-coal generally accompanies lignite and is found under and interbedded with it.

Mormon Board.—A board broad, reinforced and provided with handles and eye bolts. Used to back fill pipe line ditches by means of teams or tractor.

Mother Hubbard Bit.—The Mother Hubbard while widely valuable is especially useful for working in a hole that muds up easily, or where the rock is hard and contains wide seams. The bit is almost as wide at the top as at the cutting point and the steel is exceptionally thick, with the result that the bit so nearly fills the hole that it is not likely to slip off into slanting openings. The water course is wide, and rounding. The sharp shoulders on the bit cause it to cut its way through the mud when pulling out.

Mother Oil.—Crude petroleum from which other crudes have been derived.

Motor.—Any machine used to convert heat or electrical energy into mechanical energy.

Motor Fuel.—A fuel for supplying heat energy to a motor. In practice, this term more particularly applies to the fuels used for automobile motors such as gasoline, benzol, etc.

Motor Gasoline.—A commercial term for gasoline sold for use with automobiles. The quality and characteristics of such a fuel are variable and cannot be strictly defined. It may be straight run, blended casinghead, or cracked gasoline. The gravity may run from 55° Be. to 64° Be., depending upon refinery conditions.

Motor Oil.—A viscous neutral oil, identical with compressor oil.

Motor Spirit.—The saturated aliphatic hydrocarbons of American oil, the polymethylenes from Baku oil or the unsaturated hydrocarbons derived from shale oil, as well as benzine $C_6 H_6$ and alcohol $C_2 H_5 OH$. Are employed in internal combustion engines. The lubricant is usually of the same ghade as either compressor oil or aeroplane oil.

Mould Oil.—Glass works mould oil is of the same grade as compressor oil. China Works mould oil is of two recommend grades: Transformer oil and Summer Black oil.

Muckite.—A resin from the coal beds of Neudorf, Moravia, it fuses between 290° and 310° C., has a specific gravity of 1.0025, and a composite corresponding to $C_{20} H_{28} O$.

Mud.—Moist and soft earth, or earthly matter, whether produced by rains on the earth's surface, by ejections from springs and volcanoes, or by sediment from turbid waters; mire. In drilling, the emulsion made by the mixture of water with the drillings in the drill hole. A preparation of clay and special materials prepared in solution for circulating in a drilling well. See: Mud Laden Fluid.

Mud Barrel.—An instrument used in freefall drilling which serves to raise to the surface the debris formed at the bottom of the well by the action of the bit. A diminutive bailer.

Mud-Bit.—A chisel-like tool used for boring wells through clay.

Mud Hog.—A pump to circulate mud laden fluid through the drill stem and the well when drilling by the rotary method, See: Slush Pump.

Mud-Laden Fluid.—A dense fluid of water and mechanically mixed clay or earth, has a specific gravity of 1.20 or more, and weighs about ten pounds per gallon. The emulsion of mud and water which is circulated during rotary drilling.

Mud Lubricator.—A device by which mud is used to smother a strong gas flow by means of lubrication, very much the same as in a closed vessel used to lubricate against the steam pressure of an engine.

Mud Mixer.—A mixing machine used to prepare mud for use in drilling.

Mud-Off.—In drilling to seal the hole off from the water or oil by using mud. Cement now generally used for this purpose. Cement pumped down through casing and made to come up on outside.

Mud-Pump.—A pump used to pump mud laden fluid in order to maintain circulation in a drilling well. See: Slush Pump, Mud Hog.

Mud Pump Valve.—Valves of special design for mud pumps.

Mud Sill.—The lowest sill of a structure, usually imbedded in the soil, the lowest sill or timber of a house, bridge, dam or derrick.

Mud Socket.—A device used on drilling tools to clean mud or sand out of a well.

Mud Volcano.—An outburst of water, sometimes heated with a rumbling noise, and sometimes forming a conspicuous cone many feet in height. A hollow cone in a volcano region, from which material is ejected, by and with various gases. The usual quiet emissions are interrupted at times by violent discharges, sometimes with columns of flame.

Mungle Shale.—The Mungle shale, which averages about 2 feet in thickness was formerly worked in the West Calder district Scotland. It is separated from the Grey shale of the "two foot coal," which formerly worked as cannel at Drumoross, near Bathgate.

Mus.—A greasy mud, sometimes found on bituminous crusts.

N

Napalite.—A peculiar waxy hydrocarbon found in the Phoenix mine, eight miles southeast of Middleton. Formula $C_8 H_4$.

Naphtha.—An artificial, volatile, colorless liquid obtained from petroleum; two grades, viz., light and heavy, the former used as a solvent in the manufacture of paint and varnish and as a cleaning fluid and the latter is used for blending with casinghead gasoline to produce motor gasoline and for turpentine substitute. The extremely light and heavy naphthas overlap the lower gasolines and higher kerosenes respectively.

Naphtha Gas.—Illuminating gas charged with the decomposed vapor of naphtha.

Naphthaline.—$C_{10} H_8$ A white solid crystalline hydrocarbon of the aromatic series obtained by the distillation of coal tar. When melted, it can be used as a motor fuel, and in solution of certain tar distillates it forms an important fuel for Diesel engines.

Naphthalene Oil.—A liquid aromatic hydrocarbon obtained by the distillation of coal tar, and contains about 40 per cent of solid naphthalene.

Naphthaometer.—An "automatic" tester for determining the flashing point of oils, devised by Parrish and subsequently improved by Engler.

Naphthene Series.—A hydrocarbon series having the general formula $C_n H_{2n}$. These are ring or cycle compounds very seldom found in the lighter fractions of petroleum but frequently found in the heavier fractions. Some Louisiana oils contain lighter naphthene. The napthenes contain such compounds as Cyclopropane, Cyclopentane, Cyclohexane, etc.

Naphthenic Acids.—Normal oxidation of the naphthene series of hydrocarbons. Naphthenes oxidize thus more readily than do other hydrocarbon series and consequently naphthenic acids are usually found in petroleums of the Russian Type which are high in hydrocarbons of the naphthene group. The rank odor of these compounds has thus far prevented their utilization.

Naphthology.—The subject of petroleum and its products.

Nascent State.—The condition of an element at the moment of liberation from a compound, marked, as in the case of hydrogen or oxygen, by a chemical activity greater than the ordinary.

Native Paraffin.—See: Ozokerite.

Natural Gas.—A hydrocarbon gas found in nature of variable composition, which is usually high in methane and olefine gases. It may or may not be associated directly with petroleum. It is used as a fuel, is generally much higher in heat content than manufactured gas. It contains 900 to 1200 B. T. U., per cu. ft.

Natural Gasoline.—A product from wet gas of an oil bearing reservoir. The gasoline was first produced by natural condensing in gas pipe lines. It is being manufactured in modern factories and is prepared for use in motors of automobiles, airships and general purposes.

Naumene Number.—A number indicating the amount of fatty oils or rosin oil contained in mineral oils, either used for compounding or as adulterants.

Neatsfoot Oil.—An animal oil obtained by boiling the hoofs of cattle and skimming the oil from the surface of the water. This oil is used principally for softening leather for dressing friction clutch leathers, and for belt dressings.

Needle Valve.—At times called needlepoint valve. A valve provided with a long tapering point in place of the ordinary valve disk. The tapering point permits fine graduation of the opening.

Neutral.—Between or halfway. A CHEMICAL NEUTRAL substance is one that is neither acid nor alkaline. Derived by fractional distillation.

Neutral Oils.—Oils carrying paraffin, which are obtained by the steam-distillation of paraffin-base petroleum after the second-grade illuminating oil has been run off. Neutral oil carrying paraffin is known as "wax distillate." An oil of 32° to 36° Baume gravity 290° to 318°F., flash point and 47 to 81 sec. Saybolt viscosity at 70°F. It contains animal or vegetable oils.

Nipple.—A short pipe threaded on both ends and used to connect up fittings in convenient manner.

Nitric Acid.—A powerfully active acid which combines with nearly all metals, and which has a strong oxidizing effect on organic materials.

Nitrocellulose.—A term used to include the various nitrates of cellulose, such as gun-cotton, nitrocotton, nitrojute, etc., the most common of these is nitrocotton.

Nitrocotton.—A chemical combination of ordinary cotton fibre with nitric acid. It is explosive, highly inflammable, and in certain degree of nitration soluble in nitroglycerin.

Nitrogelatin.—Same as gelatin dynamite.

Nitrogen.—N. A gaseous non-metallic element having but little chemical affinity for other elements. It forms many unstable compounds, the most noted of which is dynamite. In itself it is inert and does not enter into the process of combustion although it constitutes about 77 per cent of the atmosphere. Many natural gas wells produce great volumes of nitrogen gas and this is detrimental for the reason that it lowers the heat content of the natural gas by displacing the methane and ethane.

Nitrogylcerine.—An extremely explosive and unstable nitrogen used in blasting and shooting oil wells. It is the basis of dynamite. It is a heavy oily fluid which freezes at a comparatively high temperature. Dynamite is simply nitroglycerine absorbed in infusierial earth for convenience in handling.

Nitronaphthalene.—Nitronaphthalene is used to deprive mineral oils of their flourescence; it is said that 2 to 3 parts are sufficient for 1,000 parts oil.

Nitrosubstitution.—The act or process of introducing by substitution the radical nitryl NO_2 in place of one or more replaceable hydrogen atoms, as in an organic compound. Nitrosubstitution compounds are used in the manufacture of certain kinds of explosives.

Nonane.—C_9H_{20}. A hydrocarbon of the paraffine series contained in gasoline, boiling point 150°C.

Non-Carbon Oil.—An oil containing little or no free carbon in suspension with a very small content of unstable hydrocarbons which will decompose and form deposits.

Noncosane.—$C_{29}H_{60}$ was separated during the course of an investigation on the composition of commercial paraffin.

Non-Oleaginous Lubricants.—In a few exceptional cases oily lubricants are inapplicable. For instance, in chlorine or oxygen compression plants, wherein mineral oils would be chemically attacked, concentrated sulphuric acid and dilute glycerine respectively are the lubricants used. In the manufacture of sulphur dioxide the liquid dioxide itself acts as a lubricant for the pistons and cylinders.

Non-Viscous Neutral Oils.—Oils having a viscosity below 135 Saybolt at 100°F.

Normal Benzine.—Benzine of the specific 0.695-0.705 at 15°C. and boiling from 65°-95°C., proposed in Germany for the purpose of detecting and estimating asphalt in petroleum.

Normal Pressure.—Standard pressure, usually taken to be equal to that of a column of mercury 760 mm in height. Approximately 14.7 pounds per square inch. Mean atmospheric pressure at sea level.

Normal Solution.—A solution containing one gram-equivalent of the solute in one liter of solution.

Nose.—Why this name is applied to a certain type of monocline commonly found in the Mid-Continent region becomes apparent upon inspection of the waving lines which the petroleum geologist employs to denote structural dips, folds, thrusts, etc. The lines representing it picture quite clearly a slightly uptilted nasal organ. This form of structure grows out of normal dip condition and sometimes is called a plunging anticline.

Nozzle, Carbureter.—The jets or tubes through which the gasoline is sprayed to mix with the incoming air.

Nujol.—One of the proprietory names for liquid petrolatum.

O

Obispo.—This "condensed" or "blown" oil originates in California petroleum; it contains 99.6 per cent of bitumen soluble in carbon disulphide, 61.5 to 63.4 per cent of bitumen soluble in 88° Be., naphtha 35.7 to 38.2 per cent of pure bitumen as saturated hydrocarbons 0.1 to 0.3 per cent of paraffin scale 1.22 per cent of sulphur, and 17.3 to 19.6 per cent of ash free residual coke.

Oblate.—A sphere flattened so that the diameter is at a maximum midway between the poles OBLATE SPHEROID. This is the shape assumed by a drop of liquid when resting on an oiled or non-adhesive surface.

Obliteur Rings.—Thin copper piston rings having a cup-leather construction, used in rotary air-cooled aeronautic engines. Such rings are necessary to take care of the cylinder distortion due to unequal cylinder cooling and are more flexible than the standard piston ring.

Occlude.—To take in and retain in pores or other openings, to absorb; used particularly with respect to the absorbing of gases by certain substances which do not thereby lose their characteristic properties, as charcoal, iron, etc.

Octane.—C_8 H_{18}. A normal hydrocarbon of the paraffin series present in large quantities in gasoline. Boiling point 125.5° C. Specific gravity 0.703 .

Octodecane.—C_{18} H_{38}. Liquid paraffin extracted from petroleum. Specific gravity about 0.850, boiling point above 216° C.

O. D.—Abbreviation meaning OUTSIDE DIAMETER.

Odometer.—An instrument used for measuring distance passed over by wheeled vehicle and also in topographical surveying in regions traversed by roads. The wheel is generally 10 feet in circumference and is made with great care. Used in preparation of county maps.

Odor.—A smell. Many crude petroleums have a very disagreeable smell generally due to the sulphur compounds contained as impurities. The same is true of the crude benzines distilled from such oils. Subsequent treatment of the oils in the refining process most commonly by sulphuric acid, removes these odors leaving a sweet product.

Odor Test.—A crude method of testing the degree of refining by the odor of the product, whether "sweet" or "sour."

Off-Prime.—A grade of lard oil about third removed from the highest quality.

Offset.—In surveying a short distance usually measured at right angles from a line as to a boundary or to continue a line parallel to itself at some little distance away to avoid an obstruction or the like. In well drilling a tool used in fishing.

Offset Oil.—An oil for moistening the felt rollers in an offset type printing press used for printing pictorial sections. It generally consists of 95 per cent of kerosene to which is added 5 per cent of light filtered cylinder stock.

Offset Well.—A well drilled opposite to a well on an adjoining property.

Oil.—An unctuous combustible substance, liquid or at least easily liquefiable on warming and soluble in ether but not in water. This term includes fatty oils and acids; mineral oils, such as petroleum products, including lubricating oils.

Oil Bases.—Crude oils are classified into Paraffin Base oils and Asphaltic base oils according to the nature of the predominating solid residuals. Mixed base oils are those containing both paraffin and asphaltum.

Oil Bath.—A vessel containing oil used for heating objects placed in the oil or for chilling and quenching heated objects. The oil bath is largely used in the heat treatment of steels for hardening.

Oil Bloom.—In iridescent or opalescent reflection from the surface of petroleum oils and rosin oil which is a rough indication of the base of the oil, whether paraffin or asphaltic.

Oil, Bloomless—An oil from which the flourescence or bloom has been removed by bleaching or chemical treatment.

Oil, Blown.—Oil oxidized by blowing air through it while hot. This is used for increasing the viscosity of certain animal and vegetable oils such as rape, castor and similar oils.

Oil Box.—A box for oil, as for storage or lubrication. The oil box on the truck journals of a railway car is packed with oily waste.

Oil Burner.—A device designed to mix oil as a fuel with air in proper manner and proportions to permit of complete combustion in a furnace or other heating apparatus. There are two classes, namely: Atomizers and Vaporizers. These may be sub-divided for example, steam, air and pressure atomizers.

Oil Cold Test.—A test made to determine the point at which clouding or congealiation sets in.

Oil Cup.—There are many designs of oil cups used for the purpose of feeding lubricant to bearings of machinery.

Oildag.—Deflocculated graphite suspended in oil, used as lubricating medium.

Oil Dehydrator.—Device for removing excess water from oil.

Oil Ducts.—Pipes or passages for conveying oil; See: Oil Grooves.

Oil, Electrical.—Oil used for insulating electrical coils and metal parts or for assisting in extinguishing the flaming arc at the point where a circuit is opened. Such oils must have a high electrical insulating value.

Oil Emulsions.—A mixture of water and oil in which the oil is more or less permanently suspended in the water in the form of a very small droplet.

Oil Engines.—An internal combustion engine adapted for the use as fuel of an oil product and occasionally crude oil.

Oil Field.—A general oil-producing region which may be large or small, and usually consists of numerous individual pools. A district containing a subterranean store of petroleum of economic value.

Oil Filter.—A simple type of gravity filter is useful in plants where waste lubricating oil may be recovered for re-use.

Oil Flash.—A critical temperature in quenching steel with oil at which the oil flashes from the steel bar when the latter is withdrawn from the oil bath.

Oil Flotation.—A process in which oil is used in ore concentration by flotation.

Oil Fuel.—Refined or crude petroleum, shale oil, residuum tar, or similar substances, used as fuel.

Oil Gage.—An instrument of the hydrometer type arranged for testing the specific gravity of oils; an oleometer. A glass tube set in metal connections and attached to a machine to make visible the amount of oil contained in same, as in a crank case, a bearing reservoir or a tank.

Oil Gas.—Is now very largely used as an illuminating agent both alone and in admixture with coal gas and water gas.

Oil Gear Compressor.—An air or gas compressor of the gear type in which a continuously flowing stream of oil is used to make a gas tight seal between the gears inside the pump. Usually this oil is taken in at the suction side with the gas.

Oil Grooves.—Shallow grooves cut into the rubbing faces of a bearing shell to improve the distribution of oil over the shaft and bearings. The grooves are connected with the oil supply hole or cup and act like ducts in conveying the oil to the various parts of the bearings.

Oil Horizon.—The height of oil in a well or the strata in which it is located.

Oil Hydrometer.—A device used for measuring the gravity of an oil. It consists of a weighted closed glass tube which will float at various heights corresponding to the gravity of the oil.

Oil Jack.—A metal pitcher used for heating oil. Mechanism for pumping oil wells.

Oil Lagging.—A jacketed vessel using oil in the jackets for the control of the temperature.

Oil Lenses.—Small irregular patches of oil-bearing sands having a cross section similar in appearance to a glass lense.

Oil-Line Pump.—A pump for forcing crude petroleum along a pipe line.

Oil Lines.—Oil piping systems.

Oil Liver.—A gelatinous or jelly-like mass formed in lubricating oils.

Oil Log.—A record kept during the drilling and life of a well giving all data on the geological formation, depth, drilling difficulties and production.

Oil, Medicinal.—A white paraffin colorless oil from which all odor and taste have been removed. Used for the relief of constipation.

Oil, Neutral.—An oil obtained by fractional distillation of the crude and not requiring treatment with sulphuric acid. Sometimes blended with animal or vegetable oils.

Oil, Non-Viscous.—Neutral oils below 135 seconds viscosity Saybolt, Universal at 100°F.

Oil Package.—A container for oil such as a can, barrel, etc.

Oil Pad Lubrication.—Lubrication by means of an oil saturated pad placed in contact with the revolving shaft.

Oil Pan.—A sheet under casing placed below an automobile engine to catch oil drippings. Not much used in late models. (Underpan).

Oil of Paraffin.—A colorless to yellowish, limpid oil, having a specific gravity of about 0.880 and not boiling below 360°.

Oil Pavement.—A pavement rendered dust-proof by the application of a heavy thick residual oil.

Oil Pits.—Hand dug wells, excavation of the ground to a depth of a few feet and allowing the oil to collect at the bottom.

Oil Polish.—A non-viscous neutral oil used for polishing furniture, cars, etc.

Oil Pool.—A division of an oil field; the contiguous area that produces oil. The entire area of a pool is usually related to a single structural feature, such as an anticline.

Oil Producer.—An individual or firm operating oil wells and selling the crude oil.

Oil Production.—The quantity of oil produced, generally given in terms of barrels of oil (42 gallons) produced in 24 hours.

Oil Pulp.—An aluminum soap used for making non-fluid oils and greases. Consists of the aluminum salts of the fatty acids such as aluminum oleate, aluminum stearate and aluminum palmitate. It is then dissolved in oil to act as a thickener or stiffener.

Oil Rack.—The equipment used in filling tank cars at the refinery.

Oil Refining.—The process of removing undersirable impurities from crude or partly finished oils. This is generally a distillation process combined with simple chemical treatment.

Oil Refinery.—A manufacturing plant devoted to the refining of oil and the manufacture of oil products and by-products.

Oil Regenerator.—A device for economizing heat during the process of refining. The heat absorbed in cooling one product is used for heating another oil in the course of manufacture so that the demand for fuel is decreased. Sometimes known as "heat exchangers".

Oil Rights.—A term under which the ownership of oil under a given tract of ground is transferred from one owner to another by lease or purchase. In leasing or purchasing oil property it is more usual to lease or purchase both oil and gas rights, though in many cases the two substances are disposed of separately.

Oil Rings.—A method of lubricating machinery in which the rings resting on the shaft revolve with the shaft and carry up the oil from a lower reservoir. The oil is deposited in the bearings. The oil feed is therefore in proportion to the speed of the shaft and stops automatically when the machine stops.

Oil Sand.—Porous sandstone from which petroleum is obtained by drilled wells. All porous oil strata are commonly termed oil sand by the driller. Most oil sands are true sandstones, but many are porous limestones.

Oil Saver.—An appliance used in connection with the casing head when drilling to prevent tthe well from making open flow. Tightly fitted cover that goes over casing head through which the steel line is operated and about the steel line is oil tight rubber packing adjusted with screws.

Oil Shale.—A bituminous substance of rock like form carrying about 80 per cent of solid mineral matter. After mining or quarrying it is placed in retorts and heated to decompose the bituminous matter and to produce hydrocarbon oils. Various kerosenes and naphthas are thus obtained together with the equivalent of gasoline. Ammonia gas is formed in large quantities during the retorting process.

Oil Shield.—A casing used to prevent oil throwing from the moving parts of machinery.

Oil Smellers.—Fakers who pretend to have the gift of locating oil by the sense of smell or by some occult power.

Oil Still.—A device for heating and vaporizing crude oil or partly finished oils where the various hydrocarbons are separated by differences in their boiling points. The old type still is a cylindrical steel shell much like a tubular boiler, but without flues. Cracking stills generally consist of oil filled tubes with heat applied to the outside surface.

Oil Strainer.—A screen of wire gauze used for separating solid matter and sediment from oil to prevent clogging the pipe lines and passages.

Oil String.—A string of casing used to keep the oil well open through the rock formations from which the oil is entering the well.

Oil Switch.—An electrical switch immersed in oil so that the circuit is broken in the body of the oil. The oil chills the flaming arc and suppresses it so that the switch contacts are not burned and so that the flame is confined to very small dimensions.

Oil Tempering.—To harden steel by "quenching" or immersing it in oil after heating.

Oil, Topped.—Oil from which the lighter naphtha, gasoline, and kerosene fractions have been removed by straight distillation at low pressure and temperature.

Oil Traps.—Separators used in steam and ammonia pipe lines for the separation of oil and greases from the steam or ammonia gas.

Oil Vaporizer.—A device used with internal combustion engines for vaporizing heavy kerosenes and fuel oils. They are heated by the exhaust gases or by hot water from the water jackets.

Oil Well Casing.—Steel pipe used for lining the drilled well bore.

Oil Well Derrick.—A tower-like structure used for supporting the tools when drilling a well and for carrying the tackle when cleaning out a completed well.

Oil Wells.—Wells which have been sunk into oil bearing strata for the purpose of extracting petroleum. Drilled by machinery; drilled by hand power; excavated by hand labor.

Oil Zone.—A formation that contains capillary, supercapillary voids, or both, which are full of petroleum that will move under ordinary hydrostatic pressure.

Okonite.—For the production of the material of which candles are made, ozokerite is subjected to a process of distillation, patented in 1870 by Field and Siemssen. Under this process thte ozokerite is melted, pumped into stills, and distilled in a current of superheated steam. The distillate is caked, pressed with naphtha, clarified with fuller's earth, and filtered.

Old Man.—A stand designed to hold a portable drill or a hand ratchet drill. It is a short shaft with a foot and bolt to hold it in place. A radial arm can be adjusted with a set screw to suit the position desired.

Oleates.—Salts produced by the action of oleic acid on the various metals.

Oleaginous.—Unctuous, having oil-like properties.

Olefiant.—Forming an oil, or an oil-forming substance.

Olefiant Gas.—Ethylene. Heavy carbureted hydrogen.

Olefiant Gas or Ethylene.—$C_2 H_4$ which is sometimes found in natural gas is the most abundant illuminative constituent in coal gas.

Olefine.—Any one of a series of unsaturated hydrocarbons of the type $C_n H_{2n}$ = Ethylene series.

Olefines in Petroleum.—According to HOFER, the following olefines have been isolated from "North American" petroleum.

Ethylene	(C_2 H_4)
Propylene	(C_3 H_6)
Butylene	(C_4 H_8)
Amylene	(C_5 H_{10})
Hexylene	(C_6 H_{12})
Heptylene	(C_7 H_{14})
Octylene	(C_8 H_{16})
Nonylene	(C_9 H_{18})
Decatylene	(C_{10} H_{20})
Endecatylene	(C_{11} H_{22})
Dedecatylene	(C_{12} H_{24})
Decatrilene	(C_{13} H_{26})
Cetene	(C_{16} H_{32})
Creotene	(C_{27} H_{54})
Melene	(C_{30} H_{60})

Open chain hydrocarbon series of the unsaturates, having two less —of hydrogen than the paraffin series.

Oleic.—Pertaining to, derived from, or contained in an oil.

Oleic Acid.—A fatty acid existing in olive oils and animal oleins and also in linseed oil. It forms salts known as the "Oleates" used in the preparation of some lubricants.

Olein.—A glyceride of fatty oils liquid at ordinary temperatures.

Oleines.—Complex oils known as "Wool oils".

Olemeter.—An areometer or balance for ascertaining the densities of fixed oils. Standard temperature 59°F.

Oleo Resin.—The viscous to semi-solid and usually light colored solution of true resins in essential oils, either obtained from, or constituting the saps of certain plants and trees.

Once Run Oil.—The second and last cut of the crude shale oil when first distilled.

Oolite.—Rock system that looks like the roe of a fish, which consists of small grains cemented together.

Opalescent.—Reflecting a milky or pearly light from thte interior of the fluid or having an opaline play of colors of varying shades.

Open.—A fault in which the two walls are separated.

Open Cup Tester.—An instrument for determining the flash point of an oil in which the flame is exposed to atmosphere.

Open Flow Test.—A test made to determine the volume of gas that will flow from a well in a given time when the large valves are wide open.

Open Hole.—The uncased part of the well.

Open Pressure.—The pressure on a gas well that has been open long enough for the accumulated pressure to waste.

Open Sand.—Sandstone, with sufficient voids to provide good storage for oil.

Operator.—The person, whether proprietor or lessee, actually operating a mine or oil well or lease.

Optical Character.—The designation as to whether optically positive or optically negative, said of minerals.

Optical Constants.—In optical mineralogy, the inclines of refraction, axial angle, extinction angle, etc.

Option.—A privilege secured by the payment of certain consideration for the purchase or lease of mining or other property, within a specified time, or upon the fulfillment of certain conditions set forth in the contract.

Orchard Heating Oil.—This product from California petroleum is a dark oil possessing a gravity of 26° to 28° Be. it is also termed "smudge oil" and is used in the orange and lemon groves to prevent frost from injuring the trees. "Smudge oil" from Colorado petroleum usually has a gravity of 30° to 31° Be.

Ordovician.—A geologic age during which petroleum is supposed to have originated.

Organic.—Pertaining to or designating a branch of chemistry, treating in general of the compounds produced in plants and animals, and of carbon compounds of artificial origin; contrasted with inorganic.

Organic Acids.—Acids formed in organic matter, such as the fatty acids, etc., organic acids also occur in small quantities in petroleum.

Organic Chemistry.—The chemistry of organisms or living structures, such as the chemical constituents of animal tissues, plant cells and various products of living structures.

Orientation.—The rotation of a map or instrument until the line of direction between any two of its points is parallel to the corresponding direction in nature.

Orifice Meter.—A meter for measuring the flow through an orifice of known diameter. Fluids are thus metered. The differential pressure between the up-stream and the down-stream sides of the orifice is the important factor.

Oronite.—An enamel paint for protecting metal surfaces from the action of hot vapors.

Ortho.—A prefix used in chemistry in two ways; to denote what may be called a normal or ordinary compound as distinguished from others which are not normal; or to denote two adjacent positions in the benzine ring and occasionally in other rings.

Osmosis.—A kind of diffusion which takes place between two miscible fluids separated by a permeable partition, as in animal membrane, and which tends to equalization on the two sides of the partition.

Osmotic Pressure.—The unbalanced pressure which gives rise to the phenomena of diffusion and of osmosis, as in a solution in which there are differences of concentration.

Ostwald Viscosimeter.—A dynamic type instrument for measuring the absolute viscosity of an oil.

Otto Cycle.—The four-stroke cycle of the modern gas and gasoline engine proposed by Dr. Otto, a German scientist. Suction stroke; Compression stroke; Ignition; Working stroke and expansion; Expulsion or scavenging stroke for the rejection of the brunt gas.

Outage.—The difference between the full and rated capacity and the actual contents of a barrel, tank, or tank car.

Outcrop.—The coming out of a stratum to the surface of the ground. That part of a stratum which appears at the surface. To crop out; to come out to the surface of the ground as strata.

Oval Socket.—A fishing tool used to slip over the ends of broken rods to grip so as to recover them.

Over.—The fraction of gasoline distilled and passed over by the condenser.

Over Flow Pipe.—A pipe near the top of a storage tank through which the excess of fluid passes out. A pipe or orifice used to limit the height of fluid in a vessel.

Over and Short.—Balance between calculated stocks of oil and oil actually on hand due to expansion, contraction, losses or faulty measurement. Balance between bookkeeper's statement and oil on hand.

Overburden.—The waste which overlies the good stone in a quarry. Worthless surface material covering a body of useful mineral.

Overhead Charges.—Those general charges or expenses which can not be charged up as belonging exclusively to any particular part of the work or product.

Overhead Products.—All products which are taken off from an oil still in a vapor form.

Overlap.—A thrust fault in which the shifted strata double back over themselves.

Over Point.—In the process of distillation the temperature at which the first drop comes over into the flask.

Overshot.—A fishing tool with bell shaped end designed for purpose of bringing into line and connecting on to a piece of lost pipe or casing in a deep well.

Overthrust Fault.—A reverse fault with low dip, or large head.

Overturned.—Having been tilted past the vertical and hence inverted in outcrop; said of folded strata and of the folds themselves.

Oxidization Oven.—A laboratory apparatus for determining the rate at which atmospheric oxygen combines with an oil.

Oxidize.—To combine with oxygen by direct contact with oxygen or with an oxidizing agent.

Oxweld.—See: Acetylene for description of welding which is the same as the process under this trade name.

Oxygen.—O. A gaseous element occurring free in the atmosphere, of which it forms about 21 per cent. It is chemically very active and supports combustion, the combination of the oxygen with other substances generally producing heat. It is the basic factor in combustion, and in combining with the fuel to produce heat, forms several by-products, among which is water vapor.

Oxygenated Oil.—Oils partly oxidized as with blown oils.

Oxy-Hydrogen Flame.—A flame of hydrogen burning in an atmosphere of pure oxygen that gives an intense heat and is used for welding and cutting metals.

Ozokerite.—Mineral wax. Native paraffin, fossil wax. A native mixture of hydrocarbons which occurs in translucent yellow, brown to greenish masses, soluble in carbon disulphide. It is used as an insulating material for paints, leather polish, sealing wax, candles, etc. Same as Ozocerite.

P

Pace Counter.—Instrument for approximate measuring of distances by pressing lever for every other step taken. Operated by enertia when designed to be worn or carried in a pocket upon a person.

Packer.—A device used to prevent water and other foreign matter from getting into the oil sand. A rubber expanding ring surrounding a tube to be run on casing or tubing and expanded to prevent fluid passing.

Packing.—A general term relating to a yielding material employed to effect a tight joint. A common example is the sheet rubber used for gaskets. The term is also applied to the braided hemp or metallic rings used in some joints, that allow considerable motion. Used in a stuffing dox thru which a polish rod or a valve stem runs.

Paddy.—A well drill having cutters that expand on pressure.

Paint Oil.—One grade is a sun-bleached neutral oil, pale lemon in color, possessing a gravity of 36° Be., a flash point of 260° F., a fire test of 320° F., a cold test of 20° F., and a viscosity of 55. The nonviscous oil described as concrete form oil is also used by painters.

Paint Thinner.—Turpentine substitutes.

Painters' Naphtha.—Deodorized naphtha of gravity 58 to 60 is sometimes employed in paints.

Paleography.—A description of a region as to its rock characteristics. Geography of former lands and seas.

Paleontology.—The study of evidences of the life of the past as preserved in the rocks; more specifically a study of fossils, especially in their application to problems of correlation.

Palezoic Age.—The most productive geologic age in American petroleum bearing sedimentary rocks.

Palm Oil.—Oil produced from the fleshy layer or pericarp surrounding the woody shell of the African oil palm nut. It varies from yellow to a deep red, has a pleasant odor. The melting point ranges from 80° - 110° F. The fatty content ranges from 10 to 40 per cent. Used in manufacture of lubricating greases and vegetable soaps.

Painter's Naphtha.—A turpentine substitute consisting of deodorized 58/60 naphtha. Sometimes used in paints.

Palmitin.—A colorless crystalline substance in natural fats which produce palmitic acid on saponification and are contained in large quantities in palm oil.

Paper Mill Foam Oil.—Usually identical with paint oil.

Paraffin.—A hydrocarbon belonging to the methane series, obtained from paraffin base petroleum, first obtained from dry distillation of wood. A white, waxy inodorous tasteless substance, harder than tallow, softer than wax, with a specific gravity of 0.890. Its melting point is variable, depending somewhat upon its origin; it ranges between 43° and 65°C. (109° and 151°F). An ultimate analysis yields on the average, carbon 85% and hydrogen 15%. It is insoluble in water, is indifferent to the most powerful acids, alkalies, and chlorine, and can be distilled unchanged with strong sulphuric acid. Warm alcohol, ether, oil of turpentine, olive oil, benzol, chloroform and carbon disulphide dissolve it readily. It can be mixed in all proportions with wax, stearin, palmitin and resin.

Paraffin Acid.—This acid is formed by oxidizing paraffin by a concentrated solution of nitric acid.

Paraffin-Asphalt Petroleum.—The so called "mixed base" crude oils of the mid-continent and southern fields. These oils contain both paraffin and asphaltum.

Paraffin-Base Petroleum.—Crude oil which carries solid paraffin hydrocarbons and practically no asphalt.

Paraffin Butter.—A variety of native paraffin used in making candles. Also one of the past products of petroleum distillation.

Paraffin Coal.—A very light colored bituminous coal used for the production of burning oil and paraffin.

Paraffin Dirt.—Soil of the Gulf Coast region believed to be formed by the action of escaping gas on peat or humus. It is doubtful whether it contains any true paraffin.

Paraffin Distillate.—A crystalline product ready for pressing used as the base for paraffin wax and paraffin oils. This base for paraffin wax and paraffin oils should be distinguished from wax distillate produced by steam reduction of fuel oil, the former being a crystal line product ready for pressing, the latter, a semiamorphous substance requiring additional re-running.

Paraffin Fluxes.—The residuals obtained from paraffin-base petroleums are characterized by containing 14½ to 4 per cent of hard paraffin scale, consisting to a predominating degree of saturated hydrocarbons (85.6 to 74.1 per cent) and having a specific gravity of 0.92 to 0.94. Those derived from the paraffin oils of Ohio and Pennsylvania may be said that paraffin fluxes yield only a small percentage of residual coke and contain but little sulphur.

Paraffin Hydrocarbons, Paraffin Series.—This series of hydrocarbons compose the lighter and more volatile constituents of all petroleums. They are of the "saturated" sulphuric acid or fuming sulphuric acid. In fact that are extremely resistant to all chemical reactions. Progressively a few examples of this series are: Methane, Ethane, Propane, Butane, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, etc.

Paraffin Oil.—A clear wax free oil obtained by pressing wax distillate. A treated oil obtained by cracking ranging from 30° to 20° Be. gravity and 300°F to 450°F flash point. Viscosity from 40 Saybolt. A liquid petrolatum or jelly. In the majority of cases the first and second definition hold true.

Parafinnic Acid.—C_{24} H_{48} O_2. It is obtained by the oxidation of paraffin by concentrated nitric acid or by chromium trioxide mixture. It is also easily oxidized by air when warm and exposed to light.

Paraffin Base Oils.—Paraffin base crude oils are so called because they carry from 2 to 6 per cent of paraffin wax in solution. They carry a fairly high percentage of gasoline and kerosene and only a little sulphur, oxygen or nitrogen. They have a very low specific gravity. Examples are the well known Pennsylvanian oils. West Virginia, Ohio and Kentucky crudes. The mid-west crudes are largely paraffin with only a little asphalt content, while the oils of the Rocky mountain regions are as nearly as pure paraffin base oils as Pennsylvania variety.

Paraffin Scale.—Crude paraffin wax.

Paraffin Scale Wax.—The crude wax containing oil, coloring matter, paraffin wax, etc.

Paraffin Wax.—A colorless, more or less translucent mass, crystalline when separating from solution, without odor or taste, and slightly greasy to the touch, consisting of a mixture of solid hydrocarbons, chiefly of the methane series. Refined paraffin wax is pure white, the better grade being of the methane series.

Paraffin Slack Wax.—Wax from which oil is extracted by pressing, but which still contains oil that must be sweated out. Slack wax contains about 50 per cent of paraffin wax and 50 per cent oil.

Paraffin Sweated Wax.—A paraffin wax which is freed from oil by a process of heating and "sweating" the oil out of the slack wax from the presses. The oil sweated from the slack wax is called "Foot's oil".

Paraffin-Xylol.—Solution of paraffin wax in xylol used by surgeons as a protective coating or varnish for the hands.

Paraffinum.—Paraffin wax of the Pharmacy and according to medical control.

Paraffinum Liquidum.—Medicinal white oil or bleached paraffin oil.

Paraffinum Molle.—According to the British Pharmacopoeia, a petroleum product corresponding to the vaseline of the United States Pharmacopoeia.

Parallel Displacement.—A fault in which all straight lines on opposite sides of a fault and outside of the dislocated zone that were parallel before the displacement, are parallel afterward.

Parianite.—Asphalt from the Pitch Lake, Trinidad.

Parol.—A fuel for use in internal combustion engines, introduced in 1913; it has been reported that it is "made from paraffin by a chemical process and without use of heat."

Parr Calorimeter.—A laboratory instrument for determining heat quantity in a fuel or fuel oil.

Pavement.—The wearing course of the roadway or footway, when constructed with a cement or bituminous binder, or composed of blocks or slabs, together with any cussions or binder course.

Pay, Pay Sand, Pay Streak.—That portion of an oil or gas sand in which the oil, gas, or valuable mineral may be found in commercial quantity.

Paying Well.—A well which yields oil or gas in commercial quantities; that is to say, in quantities reasonably calculated eventually to return to the owner the cost of the well, plus the expense of operating it.

Pearlite.—Steel is composed of a number of different iron carbides in solution with the pure bulk iron. Pearlite is one of these compounds, consisting of a mixture of ferrite and cementite, both of which carry different carbides. These compounds are principally of importance because of their effect on the hardening of steel during quenching and other heat treatments.

Pease's Electric Tester.—An instrument in which the vapor of petroleum is ignited by an electric spark passing above the oil cup, which rests in a water bath.

Peat.—Peat is an incomplete coal or an immature coal which has not been sufficiently compacted or aged to produce true coal. It is the product of vegetation found in peat bogs, and is of a soft brittle nature. It forms a considerable amount of ash and a great amount of water so that it is not an efficient fuel when other fuels can be readily obtained.

Peat Tar.—A tar obtained from the distillation of peat. The distillates obtained contain from 2 to 6 per cent of tar.

Pedestal Bearing.—A bearing of the floor type which carries the shaft well above the floor level on a sort of strand.

Peen.—The end of a hammer-head opposite the face and shaped for indenting or riveting metal; as a ball peen.

Peening.—The act or process of hammering metals with the peen of a hammer either to straighten them or to impart a desired curvature.

Peg.—To mark out a miner's claim by pegs at the four corners, each bearing the claimant's name.

Peg Legging.—The driller knows that if he does not let out screw fast enough to keep pace with the tools when he is drilling with a wire line the tools will go beyond the limit of the line's elacticity and continued jerking eventually will part the cable. When the limit of elasticy has been reached the tools usually begin to hit on each alternate stroke only, and the action at the bottom of the hole suggested to some imaginative mind the unequal footfalls of a one-legged man; thus warning the driller that he must let out screw came to be called "peg legging".

Peg Model.—A model of wells made of pegs or long round sticks and marked to show relative locations of oil, gas and the various rock formations.

Pencil Cave.—The name given to the shale which in some places separates the Greenbrier limestone into two layers known familiarly as the Big Lime and Little Lime of Ohio, Pennsylvania and West Virginia. The Greenbrier limestone or Big Lime is one of the most readily identified markers from which to estimate depths of lower sands. The shale which sometimes divides into two strata necessitating the distinguishing designations "BIG & LITTLE" has come to be known among drillers as "Pencil Cave" because of its disposition to cave into the hole in pencil shaped fragments during drilling.

Penetrating Oil.—A thin non-viscuous oil used for oiling between the leaves of automobile chassis springs. The penetrating ability of these oils make it possible to thoroughly lubricate thin spaces without spraying the leaves or taking them down.

Penetration.—In laboratory investigation of paraffin, waxes, asphalt, etc., the distance expressed in tenths of a milli-meter, penetrated by a No. 2 cambric needle operated in a machine for the purpose and under known conditions of loading, time and temperature. The degree of solidity of bituminous materials. In construction, the entrance of bituminous material into the interstices of the metal of the roadway.

Penetration Method.—The method of constructing a bituminous macadam pavement by pouring or grouting the bituminous material into the upper course of the road metal before the binding of the latter has been completed.

Penetration Test, Asphalt.—The consistency or hardness of asphalts and other bituminous materials is expressed as being the distance penetrated by a standard size weighted needle placed on the asphalt, the penetration continuing for a specific length of time.

Penetrometer.—A device used to determine the consistency of asphalt, and bituminous substances, by measuring the distance a standard needle will vertically penetrate a sample of asphalt, when weighted with 100 grams for five seconds at 25°C.

Pennalene White Oil.—A water-white odorless oil for medicinal purposes.

Pennsylvanian Series.—A series of sedimentary rocks of great importance in the oil geology of America and which appear in many oil fields.

Pensky-Martins Tester.—An instrument for determining the flash point and fire-point of petroleum products. The type most used is the "closed" tester. A modification of the Pensky Martens tester devised by the U. S. Bureau of Mines is now being much used in place of the original instrument.

Pentadecane.—C_{15} H_{32}. His been isolated from Pennsylvania petroleum. Also separated from commercial paraffin.

Pentacosane.—Pentacosane C_{25} H_{52} has been separated from the hydrocarbons in Pennsylvania petroleum.

Pentane.—One of the lighter and more volatile of the gasoline hydrocarbons having a boiling point of 36.3°C., and a specific gravity of 0.630. Formula is C_5 H_{12}. It belongs to the paraffin series of hydrocarbons (Saturated.)

Pentane Lamp.—A standard lamp burning pentane used for determining the candlepower of various illuminates.

Pentylene.—A member of the unsaturated group of hydrocarbons known as the Olefines or Ethylenes which seldom occur naturally in crude oil but which are developed by distillation at high temperatures. Formula: C_5 H_{10}.

Percussion System of Drilling.—See: Drilling; Free Fall and Churn Drill.

Perfumery Oil.—Refined Russian odorless petroleum used by the purfumer and pharmacist. Special gravity equals 0.880 - 0.885.

Peripheral Velocity.—The speed in feet per minute or feet per second at the circumference of a revolving wheel. This is equal to the circumference in feet multiplied by the revolutions per minute or per second.

Periphery.—The circumference of a circle or the distance around the outside edges of a polygon or circle.

Periodic Law.—"The properties of the elements are periodic functions of their atomic weights". This law shows that a relationship exists between the atomic weights of certain elements, which on account of the simplicity of their properties are usually grouped together to form a family. Thus, lithium, sodium and potassium have very similar chemical properties and are therefore in one class. The atomic weight of sodium is approximately the average of the other members of this group, hence there is a definite relation between the atomic weights and properties of certain groups of elements.

Perkins Joint.—A joint consisting of threaded pipe and coupling, both threaded straight (no taper). The one end of the pipe is left square and the other is beveled to a knife edge at mid-thickness. Used in Baku oil fields.

Permian Series.—A geologic series occurring prominently in the oil fields of Kansas and northern Oklahoma.

Permeable.—Easily penetrated by solution as by water or oil; usually said of porous rocks, though not all porous rocks are permeable; those in which the pores are not well connected being relatively impermeable.

Pertenencia.—(Mex.). Mining claim. Under the modern Mexican mining law, a square of land 100 meters on a side, i. e., 1 hectare equals 2.4711 acres in the minimum unit. This unit is called a pertenencia. In Peru, equals 2 hectares, or 200 m. long by 100 m. wide; in Argentina 300 m. by 200 m. to 300 m. according to dip; in Columbia 600 m. by 240 m., a lode mining claim equaling three of these.

Peso.—A Spanish or Mexican dollar, also a silver coin used by several Central and South American countries. Worth nearly 50 cents of U. S. A. Money, nearly the same as the "Sole" in Peru, one tenth of a "Libre" or a pound (£).

Petrocene.—A greenish yellow hydrocarbon with a pearly luster and needle-like crystals, obtained by the distillation of petroleum residue at a read heat.

Petrohol.—Name given to a by-product of mineral oil manufactured in 1920 by the Standard Oil Company.

Petrol.—A variant for petroleum or its derivatives, particularly gasoline or motor spirit.

Petrolatum.—Petrolatum or soft petroleum ointment is a light yellowish or yellow semisolid, possessing a specific gravity of 0.820 to 0.850 at 60° C. and melting at 45° to 48° C. It is soluble in ether, chloroform, benzine, carbon disulphide, slightly soluble in alcohol and insoluble in water and glycerine.

Petrolatum, Liquid.—A colorless to slightly yellowish transparent liquid possessing a specific gravity of 0.840 to 0.940 at 25° C. It is soluble in ether, chloroform, carbon disulphide, benzine, benzol, boiling alcohol, but is scarcely soluble in cold or warm alcohol, and is insoluble in water

Petrolatum Stock.—This material, the base for all light petrolatum, varies from light yellow to dark green in color, according to the nature of the materials used in its manufacture.

Petroleum.—In its widest sense the term petroleum embraces the whole of the hydrocarbons—gaseous, liquid and solid, occurring in nature. The word petroleum in general use signifies an oily, inflammable, liquid mixture of numerous hydrocarbons, chiefly of the paraffin series, occurring naturally, oozing from crevices in rocks, floating on the surface of water, or in subteranean deposits in rocks, from which it may be obtained by drilling. The petroleums found in different areas vary widely in composition and appearance. In general, there are three kinds of petroleum, namely, paraffin-base, which carries solid paraffin hydrocarbons and little or no asphalt; asphalt-base, which contains asphalt and practically no paraffin; and paraffin-asphalt, a combination of the two. Also known as Rock Oil, Mineral Oil, Natural Oil, Coal Oil, Earth Oil, Seneca Oil.

Petroleum Asphalt.—Commercial name of the asphaltic residue resulting from the distillation of asphaltic base crude oils. It is a pitch black substance of varying consistencies used for asphalt paving, waterproofing, shingle impregnation, and many other purposes .

Petroleum Benzine.—A cut in the redistillation of crude naphtha. The "petroleum Benzin" of the German Pharmacopoeia consists of the colorless nonflorescent portions of petroleum possessing a specific gravity of 0.640, and distilling almost entirely between 55° and 75° C.

Petroleum Black.—Soot produced by burning oil used for paints and printing inks in place of the "bone-black" obtained from animal matter. It is also used in the manufacture of electrical carbons.

Petroleum Bloom.—The flourescence or irredescent cast seen in light reflected from the surface of certain petroleum hydrocarbons and resin oils.

Petroleum Briquet.—A briquet of a mixture of petroleum, soft soap, resin and soda-lye wash.

Petroleum Butter.—See: Petrolatum.

Petroleum Car.—A railroad car carrying a tank or tanks, designed for transportation of petroleum in bulk. A tank car.

Petroleum Coke.—The solid carbon or coke remaining as a residue in the tar stills after high temperature distillation. The solid carbon content (fixed carbon) varies from 88 to 95 per cent with an ash content varying from a trace to 0.3 per cent. Sulphur from 0.5 to 1.0 per cent. Because of its purity it is used largely in the manufacture of electric light carbons, carbon electrodes for electric furnaces, and many metallurgical processes.

Petroleum Composition.—Petroleum with the exception of small percentages of sulphur and gases, is composed almost entirely of hydrocarbon compounds with but little ash or mineral matter. The hydrocarbons are both of the "saturated" and "unsaturated" types

(chain or ring compounds). The boiling points range from the extremely light petroleum ethers down to the heavy thick tars in an almost infinite variety.

Petroleum Cracking Processes.—Processes for increasing the yield of gasoline by distillation at high pressure or temperatures or both. The heavy hydrocarbons are broken down into gasoline fractions.

Petroleum Crude.—The natural untreated oil obtained from the well.

Petroleum "Cuts."—See: PETROLEUM FRACTIONS.—A "cut" is made during the process of distillation at the end of each commercial grade of distillate. Thus, when all of the hydrocarbons included under the commercial specifications of gasoline have been driven off, then the next group under kerosenes are collected by raising the temperature of the still to vaporize the compounds of still higher boiling point. Each cut is made at a specified temperature that is determined by the commercial demand for certain groups of compounds.

Petroleum Distillates.—Groups of hydrocarbon compounds driven out of the crude by the application of heat in the distilling process. Typical commercial distillates are gasoline, naphtha, kerosene, gas-oil, fuel oil distillates and lubricating oil distillates, in the order named.

Petroleum Drilling.—In general, there are two methods of drilling a well: By the "percussion" method in which a heavy bit is raised and dropped repeatedly, and "rotary" method by means of a rotating cutter or boring motion of a bit.

Petroleum Ether.—Some refiners have applied this designation to the products ranging in specific gravity from 0.590 to 0.666.

Petroleum Fractions.—A hydrocarbon fraction is a group of hydrocarbon compounds distilled from petroleum between a specified high and low temperature. Commercially, a "fraction" in the true sense of the word, would be one single definite compound, but in practice a number of hydrocarbons may be contained in one fraction.

Petroleum Fuel Oils.—May be the light gas-oils and similar distillates lying between the kerosene and lubricating distillates.

Petroleum Naphtha.—A term which is loosely employed it is often denoted by the first fraction (b. p. up to 150° C.) obtained on distillation of crude oil, but is also applied to any low boiling petroleum product.

Petroleum Origin.—There is no exact knowledge regarding the origin of petroleum, although there are a number of theories regarding it. Some investigators claim that it is of animal or vegetable origin, while others state that it has been formed by chemical reactions between hydrogen and carbon bearing minerals at an early time when the earth was hot enough to affect such a reaction.

Petroleum Pipe Lines.—Crude oil is transported from the wells by pumping it through long lines of pipe, sometimes many hundreds of miles long. This is a cheaper and more satisfactory means of transport than by shipping it in tank cars. The long main lines running between field gathering points and the refineries are fed by "gather-

ing lines" from the wells to the main lines. All main lines have stations and pumps at intervals of 35 to 40 miles and a telegraph system is used to check operation much like a railway system. Much improving is being done in designing the more modern pipe line systems so that any detail which could be described today may be obsolete tomorrow.

Petroleum Pitch.—The tar-like residue remaining in the stills after the distillation of crude petroleum. It is used for electrical insulation, waterproof paints and many construction purposes where protection must be had against the weather.

Petroleum Producer.—The individual or corporation operating oil wells, and producing petroleum.

Petroleum Production.—The amount of oil supplied by a well or wells estimated in terms of barrels per 24 hours.

Petroleum Refinery.—A manufacturing plant where the various petroleum products are made from the crude petroleum. A complete refinery markets all of the products from the gasoline down to the lubricating oils, asphaltum and coke.

Petroleum Refining.—The process of separating crude petroleum into its various commercial products and the purification of these products.

Petroleum Spirit.—A term which is variously used, but is sometimes applied to a petroleum distillate of density of 0.71 to 0.74 and a boiling point of 90° to 140° C. It is used as a solvent. Some refiners have employed the term to include naphtha ranging in specific gravity from 0.679 to 0.745 (76° to 58° Be.)

Petroleum Still.—An apparatus for distilling the hydrocarbon products from crude petroleum.

Petroleum Substitutes.—Many of the petroleum distillates have proved to be satisfactory substitutes for certain of the more expensive animal and vegetable oils such as turpentine, linseed oil, etc.

Petroliferous.—Continuing or yielding petroleum.

Petroline.—A solid substance, analygous to paraffin, obtained in the distillation of Rangoon petroleum; also applied to a Scottish burning oil having a flash point of 126° F.

Petrosapol.—An ointment-like compound of soap and petroleum by-products used as a base for salves, etc.

Pez.—(Sp.) Pitch; tar; asphalt.

Pharmaceutic Naphthene Oil.—A designation of liquid petroleum.

Phenol.—A coal tar product of which carbolic acid is a derivative.

Phenolphthalein.—This is used as an "indicator" in chemical analysis and is very sensitive to acids and alkalis. It remains colorless in an acid solution and turns red when the solution is slightly alkaline.

Phinotas Oil.—An insecticide containing coal tar phenols and light petroleum distillate.

Phosphide.—Formed by the direct action of phosphorous on a metal or salt.

Phosphor-Bronze.—A strong bronze or copper-tin-zinc alloy very often used as bearing bushings or as a backing shell for a babbit-lined bearing . Its name is misleading, as the various compositions rarely contain phosphorous in any form.

Phosphene.—An inflammable and evil smelling gas (poisonous) formed by the direct combination of phosphorous and hydrogen gas.

Phosphorous.—(P.)—One of the elements, yellow wax-like solid which oxidizes rapidly or bursts out into fierce flames with almost explosive violence when brought into contact with the air or oxygen. It is chemically very active and combines with many substances to form phosphides or acids. An allotropic form of phosphorous is less active and less poisonous than the better known form. It is red in color and is used by matchmakers because of its more passive and less poisonous nature.

Photo Cell.—An electric device sensitive when acted on by light and used for the electrical control of devices which are to be actuated by variations in the strength of light rays.

Photometer.—An instrument used for measuring the intensity of light, generally in terms of candlepower. It compares the densities of shadows cast by a standard candle and the light to be measured.

Piauzite, Piauzit.—An asphaltoid substance, melting at 315° C.; it has a brownish or greenish black color and specific gravity of 1.220. After fusing, it burns with an aromatic odor, and leaves about 6% of ash. It is soluble in potassium hydroxide and in ether.

Picnometer.—A delicate bottle used for the measurement of specific gravity. The sample in question is weighed on a delicate balance while contained in a picnometer bottle.

Piezometer.—An instrument for experiments on the elasticity of liquids; the latter are subjected to an increase of pressure and the resulting dimunition of volume is observed.

Pilots Tube.—A tube bent at right angles which inserted in a flowing stream receives the force of the current and measures its velocity by the rise of water in the vertical branch. Also called "Pilot Tube."

Pin.—A sharp shaft of metal used to fasten two or more objects together, coupling or dowell pin, to join together with a pin.

Pine Oil.—A vegetable oil obtained by the destructive distillation of conifers (pine) tree roots, the vapors being rectified by passing over calcium hydroxide and charcoal.

Pine Tar.—A vegetable tar made from the resin of pines or other conifers. It is used for lubrication where adherence is one of the important features and hence is much used for the lubrication of steel cables, railroad track, curves and similar places exposed to the weather.

Pinions.—A pinion is a small gear or "cog" wheel where two or more gears are meshed together to form a gear train; the smallest gear is called the "pinion" while the largest gear is the "spur." In general a pinion is not considered to have more than 12 to 18 teeth.

Pinking.—See: Detonation. A light knocking in an engine caused by poor quality of gasoline.

Pipe.—A long conducting passage, any long tube or hollow body; especially one that is used as a conductor of water, oil, or other fluids, as drain pipe, water pipe, etc.

Pipe Dog.—A hand tool that is used to rotate a pipe, consisting of a small, short steel bar whose end is bent at right angle to the handle, and then quickly returned, leaving only enough space between the jaws to slip over the wall of pipe.

Pipe Grab.—A clutch for catching and raising a well pipe.

Pipe Grip.—In steam and pipe fitting, an implement consisting of an iron bar with a curved end and provided with a chain of square links to hook on to the jaws of the curved end, more often called chain tong.

Pipe Machine.—There are many makes of machines called pipe machines for the purpose of cutting and threading metal pipes.

Pipe Jacks.—A wooden piece or steel tube about 4 ft. long with projecting pins arranged to support the end of a joint of pipe while it is being stabled and screwed into the coupling of a pipe line. It is supported by a "growler board."

Pipe Line.—A line of pipe, sometimes many miles in length, through which petroleum or gas is conveyed from an oilfield to storage, market or refineries. The whole equipment, including pumps, stations, tanks and telegraph lines is commonly designated as "pipe line."

Pipe Line Clamp.—This is also called "river clamp." It is used to clamp over tthe couplings on a pipe line to reinforce same at the screwed connections. Used at river crossings and places where the line is subjected to severe stress.

Pipe Line and Tank Farm Stocks.—Petroleum that has been removed from the producing properties but not delivered to refineries or to other consumers and is held on tank farms, in tanks along pipe lines, and in the lines.

Pipe Manifold.—A long cylindrical fitting into which a number of pipes are connected. This avoids the use of tees when the pipes are to be connected closely together.

Pipe Nipple.—A very short length of pipe.

Pipe Prover.—An apparatus for testing the tightness of a pipe-line or system, usually by hydraulic pressure.

Pipe Riser.—A vertical run of pipe.

Pipe Threads.—The standard tapered Briggs thread is used for threading pipe. Small pipes are threaded by hand while large pipes are threaded on pipe threading machines or on a lathe Line pipe, casing and tubing is now threaded for oil industry by the specifications of the American Petroleum Institute.

Pipe Thread Protector.—A short threaded ring to screw onto a pipe or into a coupling to protect the threads while the pipe is being handled or transported.

Pipe Tongs.—A hand tool for gripping or rotating pipe.

Pipe Vice.—An apparatus to hold pipe while it is being cut or threaded.

Piping System.—A complete layout of connected piping.

Pipe Wrench.—A wrench whose jaws are usually serrated and arranged to grip with increasing pressure as the handle is pulled. There are many forms, such as Alligator, Stillson, Trimo, etc.

Pissasphalt, Pissasphaltum.—A soft bitumen of the consistency of tar; it is black and possesses a strong smell.

Piston.—A working part of a pump or an engine which moves back and forth in the cylinder. It is generally equipped with some type of ring to prevent passage of fluid and it either acts to force the fluid as in a pump or it receives force from the fluid and converts it into motion as in an engine.

Piston Clearance.—All the space remaining at the end of the cylinder where the piston has reached the position of its extreme travel toward that end. The volume of space between the piston and the cylinder head plus the volume of the connected chambers or ports when the valves at the same end are closed.

Piston Displacement.—Volume in cubic inches or other units of measure, swept out per stroke or during a given period of time by a piston.

Piston Rings.—The piston rings are thin circular iron rings fitted into the piston grooves and are so designed that they will expand against the cylinder bore and thus assist the piston in making a gas tight fit.

Piston Slap.—When the piston and cylinder bore become so worn that there is an excessive amount of clearance, then one will hear the characteristic rattle and slap of the loose piston. This can only be remedied by regrinding the bore and installing new piston and rings.

Piston Stroke.—The extreme distance traveled by the piston at each stroke.

Piston Travel.—The total distance that the piston travels measured in feet per minute.

Pit Car Oil.—This is usually of the grade described as summer black oil.

Pitch.—One of the residues formed in the distillation of wood or coal tar. It is also obtained from petroleum. The term "pitch" is sometimes employed indiscriminately to mean bitumen or asphalt. The degree of fall to a conductor of flowing liquids.

Pitch, Core Binder.—Petroleum or pine tar used as a sand binder for foundry cores.

Pitch, Glance.—A very hard and brittle bitumen with a low content of saturated hydrocarbons.

Pitch Pipe.—The slope given to a pipe for drainage of the water. Steam pipes are given a considerable pitch from the horizontal so that the condensed steam will drain out freely in the direction of steam flow, thus avoiding the shocks of "water-hammer."

Pitch, Straight Run.—A petroleum pitch run directly during distillation to the desired consistency without compounding or after-treatment.

Pithole Grit.—One of the oil-bearing strata of Pennsylvania and Ohio known as Berea grit.

Pitman.—A connecting rod designed to convert reciprocating into relative motion or vice versa. A member which connects the walking beam with the main crank; a long wooden beam with tapered ends bound with steel straps and connecting the crank and crosshead of a steamboat engine.

Pitometer.—In hydraulics, an instrument for autographically recording variations of flowing water. It consists essentailly of two pitot tubes, one pointed upstream and one downstream.

Pitot Gauge.—An instrument used to indicate the velocity of a current of liquid or gas flow either in an enclosed tube or open duct, or discharging into the atmosphere. Greatly used in oil fields for oil and gas wells.

Pitot Tube.—A tube bent at right angles used to determine the velocity of flowing fluids (gas or liquid). The open end of the tube directed against the stream converts velocity head into static head or pressure which can be read by a gauge. The reading can be used to determine the velocity in feet per second by using the formula for accelleration due to gravity and correction.

Pittsburgh Flux.—This "condensed" or "blown" oil originates in Ohio petroleum; it contains 97.6 per cent of bitumen soluble in carbon disulphide, 66.1 per cent of bitumen soluble in 88 Ve. naphtha, 55.5 per cent of pure bitumen as saturated hydrocarbons, 3.7 per cent of paraffin scale, 4.75 per cent of sulphur, and 13.7 per cent of ash-free residual coke.

Plane.—An even surface within which a straight line will remain when drawn between any two points of the plane. A tool or machine designed to finish materials to a plane surface.

Planes, Cambered.—The arched section of the wing of an airplane.

Plane Table.—A simple surveying instrument by means of which one can plot the lines of a survey directly from the observation. Consisting of a drawing board and instrument upon a tripod.

Planetary Gears.—A gear system or gear train in which certain of the gears run around the circumferences of central gears in the way that the moon, earth and planets turn about the sun. The Ford transmission is an example of a planetary gear in which speed changes are accompanied without disengaging the gear teeth, and actual reversal of motion is brought about in the same way without actually reversing the rotation of the gears themselves.

Planetary Transmission.—See: PLANETARY GEARS. The planetary gear system adapted to the automobile transmission for varying the ratio of the engine speed to the rear speed and for reversing the travel of the car.

Planeometer.—An instrument for measuring areas of plane figures or the magnitudes of surfaces. Used to average the variations of the line record of a chart from a recording gauge such as used on meters, barometers, etc., also to determine the mean pressure from an indicator card.

Plant.—A factory or works of a manufacturing concern.

Plant Account.—An account of expenditures for plant equipment, tools, etc. ,when same cannot be charged to any one authorization.

Plate Mill.—A rolling mill specializing on the manufacture of metal sheet and plates.

Platinum.—A white soft metal offering great resistance to heat and oxidization and also very resistant to the action of acids. Used in the laboratory and for linings exposed to the action of strong acids.

Platinum Black.—A black substance formed from platinum which has the peculiar property of rapidly condensing hydrogen gas or hydrocarbon gases that strike upon its surface. So rapid is the condensation, and so rapid is the liberation of heat due to the action, that the platinum black instantly ignites such gases on making contact with them. This property is utilized in automatic gas lighters, etc.

Plot.—A map, usually without detail, serving as a guide for more detailed geological or topographical work. To lay out, to scale, from field notes a map to show location, size and form of the survey.

Plug.—A piece of suitable material designed to fill a hole. In pipe work a threaded tapered piece of steel or iron with either square or oval top for wrench hold. In oil wells it may be used to stop encroachment water. Lead wool is sometimes used.

Plugging.—The stopping of the flow of water, gas or oil in a well, usually by means of a wooden plug or core or by cement or clay.

Plugs.—Necks of igneous rock rising through sedimentary rocks, often giving rise to oil accumulations.

Plumbers' Furnace Gasoline.—A gasoline of gravity 66° to 68° Be.

Plunger.—A sliding plug or piston fitting with a gas or water tight fit within a cylindrical bore. Pressure of a fluid or gas on the end of the plunger tends to cause movement.

Plunger, Pump.—The piston of a pump acting directly on the water or liquid handled.

Pneumatic.—Pertaining to the use of air; pneumatic hammers, tires, engines, etc.

Pneumatic Tools.—Tools which operate with compressed air.

Pneumatic-Tool Oil, Air Tool Oil.—Oil for the lubrication of compressed air tools must be highly refined mineral oil having a low cold test and a good adherence to moistened surfaces. A non-viscuous neutral of about 100 Saybolt is generally specified. The expansion of the air in the cylinders has a marked refrigerating effect which in winter may bring the temperature well below zero, and in all seasons there is always a quantity of water contained in the compressed air. Oil for pneumatic tools is generally of two grades.

Gravity Baume	Flash Point	Fire Test	Cold Test	Saybolt Viscosity
32°	490°F	460°F	20°F	145
34°	340°	400°	20°	80

Pneumercator.—A device for measuring the gravity and the liquid height and content of tanks or reservoirs giving direct readings. This indicator can be placed at a distance from the tank thus doing away with troublesome floats and the manual work of gauging with pole or steel line. Air transmits pressure to two graduated mercury tubes, one tube is connected to an inverted bucket near the bottom, the other to another bucket at a measured distance above. The gravity is represented by the difference of pressures as shown and when the gravity of the liquid is known the height to the surface can be determined.

Pneumostat.—A device to the PNEUMERCATOR.

Pocket.—A cavity or an especially porous lenslike bed of small dimensions which yields a sudden but temporary flow of oil, gas, water or mineral.

Pogon.—Roumanian measure. A Pogon is equal to ½ Hectare or 1.235 acres.

Poise.—The poise is the unit of absolute fluid viscosity and therefore is a unit of shear taken through a given cross sectional area of the film and at standard velocity. Numerically the POISE is the shearing force expressed in dynes per square centimeter per second.

Polariscope.—An instrument for studying the properties of, and examining substances by polarized light.

Polarization.—The process by which ordinary light is changed into polarized light. The plane at right angles to the plane of traverse vibration is called the plane of polarization.

Polarized.—Changed from the ordinary state, in which the traverse vibrations occur in all planes passing through the line of propagation, to a state in which they are in a single plane; said of light under certain conditions, especially when passed through a doubly refracting crystal.

Polarizer.—That one of the two Nicol prisms in a polarizing microscope through which the light passes before reaching the mineral section which is being examined.

Polycyclic.—A term applied to compounds chiefly of carbon and hydrogen, in which the carbon atoms are represented as grouped in two or more rings.

Polymerttic.—Having the same elements united in the same proportions by weight, but with different molecular weights.

Polymerize.—To change into another substance having the same elements in the same proportions ,but with a higher molecular weight.

Poisecuille.—A French investigator and physicist who gave much attention to the properties of fluids and after whom the "Poise" is named. He discovered a simple and very accurate method of determining the absolute viscosity of a fluid.

Polairine.—A lubricating oil for motors.

Pole.—A magnet has a north pole and a south pole, also termed positive and negative, respectively. Name given to a shaft or rod of wood.

Polar.—At the "poles" of a sphere or at the points where a diametral line cuts through the circumference of a sphere. The axis on which a sphere revolves. Relating to magnetic or electric poles.

Polar Axis.—The diametral line on which a sphere revolves.

Polar Coordinates.—A type of graphic chart in which the quantities are measured off from the radial lines and circumference of a series of circular lines, the center of this circle being the origin of the chart.

Polarity.—The nature of the terminals of an electrical device in regard to the direction of current flow. Each electrical device or circuit has a positive pole from which the current flows into the circuit and a "negative" pole to which it returns, this completing the circuit or path of flow. The designation of these poles is called the polarity.

Pole Drill.—An apparatus sometimes used to drill a shallow well. There are tools, rope and beam, or pole fixed at one end, the other suspending the tools over the well hole. Drilling is accomplished by the reciprocating action of the beam or pole.

Pole Tools.—The tools used in drilling with rods.

Polishing Oil.—That fraction of B. P. 130 to 160 obtained in refining of crude petroleum.

Polish Rod.—A steel rod with polished surface which passes thru the stuffing box of a pumping well.

Polish Rod Clamp.—A clamp which grips the polish rod of a pumping well.

Polygon.—A many-sided plane figure, the sides of which are formed by straight lines.

Polymerization.—A change that takes place in the hydrocarbon compounds of an oil when the oil is heated above a certain temperature. Some of the compounds are decomposed into lighter and simpler hydrocarbons by the simple process of chemical decomposition, but other of the components are "polymerized" into compounds of higher boiling point and higher specific gravity than the original oil. See: POLYMERIC. The same substance and weight of substance is still present, but the "polymers" have greater molecular weight.

Polyphase.—An alternating current power distribution system having more than two wires of circuits in which the current impulses occur at different times. Thus, in a three-phase circuit there are three wires forming three independent circuits in which the current waves are spaced 120 degrees apart. In the two-phase circuit there are four wires and four circuits with the current impulses differing by 90 degrees. Polyphase systems are capable of setting up rotary fields in motors which turn the armatures without the necessity of commutators.

Pomade.—A grease, salve or ointment.

Pool.—A concentration or collection of crude oil in a compact body occurring in a geologic formation.

Pore Space.—The open space, or voids, between the individual grains of a rock mass. Varies greatly, according to various estimates, that of oil sands ranging between 10 and 25 per cent.

Porosity.—The state or quality of being porous. The volume of pore space expressed as a percentage of the total volume of the rock mass. The percentage or pores of interspaces forming the total bulk of the material. The absorbent capacity of the material or the volume of liquid held by the pores.

Porous.—Cellular or having a high percentage of pore spaces.

Portable Drilling Machine.—A light compact drilling outfit mounted on wheels, or framed to be portable. These are now built and marketed by manufactures of both cable tool and rotary design.

Ports, Exhaust.—Passageways cast in an engine cylinder for carrying away exhaust steam or gases.

Ports, Inlet.—Passageways for conducting incoming gases. (Intake ports).

Posepnyte.—An oxygenated hydrocarbon from the Great Western Mercury mine, Lake County, California. It occurs in plate and nodules, sometimes brittle, occasionally hard; the color is light green to reddish brown, and the specific gravity ranges from 0.85 to 0.9850.

Post Hanger.—A bearing designed for attachment to building columns or posts, usually employed for line-shafting.

Potash.—Impure potassium carbonate obtained by purifying a solution of wood ashes, commonly known as "Lye". Potassium hydroxide, a hard, white, brittle substance of a strongly alkaline nature (caustic).

Potassium Bichromate.—A deep orange-red transparent salt formed by potassium and chromic acid. Sometimes used in standard solutions for comparing oil colors and as a refining agent in a number of special processes.

Potassium Carbonate.—A very active alkaline white substance coming in lamps sticks or granular powder.

Potassium Hydroxide.—Variously known as Potassa. Potassium Hydrate or Caustic Potash is very active alkali and rapidly absorbs both moisture and carbon dioxide gas. Specific gravity 2.044, melting point 360.5°C. Used in the manufacture of water soluble soaps and oil refining for neutralizing the sulphuric acid left after washing the distillates. A solution of the salt in water is used in gas analysis for absorbing the carbon dioxide.

Pounding.—A heavy deep noise encountered with engines and other reciprocating machinery, that is due to loose main bearings. Knocking a sharper, harder sound, may be due to other causes.

Pour Test.—A test for determining the temperature at which an oil is so congealed by cold that it will no longer flow. At a certain temperature the oil is chilled to a semi-solid mass of paraffin that will not run.

Power.—Mechanism for pumping several wells by means of lines extending from central station to each of a group of wells. Term used in the oil-fields to denote a central power plant by which several wells are pumped. The rate of doing work mechanically. It is the rate of foot pound expenditure per minute or per second of time and is expressed as foot pound minutes or as foot pound seconds. The practical unit of mechanical power is the HORSEPOWER which is the expenditure of 33,000 foot-pounds per minute or 550 foot-pounds per second. The electrical unit of power is the "WATT" 746 watts being equal to one mechanical horsepower, a KILOWATT is 1,000 watts equals 1 1/3 horsepower approximately.

Power, Band Wheel.—A large diameter pulley wheel and shaft with eccentrics. The whole assembled with the shaft vertical and the pulley horizontal; used to operate pull rods to pump jacks, thus several wells are pumped by it.

Power, Geared.—A machine designed to pump several wells at the same time by means of rod lines from one central location. A pulley is geared to a vertical shaft which operates eccentrics.

Power, Rated.—The power rating given by the manufacturer of the engine or motor. Generally the power developed at the most efficient output rather than the maximum horsepower.

Precipitate.—An insoluble solid separated from a solution and generally settling down to the bottom of the vessel by the action of some chemical regeant added to the solution, or by a change in temperature. To cause the separation and precipitation of a solid substance from a liquid.

Preheat.—To heat previously; as an oil to be subsequently distilled, or gas and oil to be used as fuel.

Preheaters.—Any form of apparatus in which heat is applied to a material prior to its injection into the main heating apparatus; usually by heat that would otherwise be wasted. Preheated air aids combustion in a furnace.

Pressed Distillate.—The oil coming from the presses when paraffin wax is recovered.

Pressure Base.—An absolute pressure agreed upon as a basis for converting the volumn of gas metered to a correct volume. There are several standards used most of them above atmospheric pressure; thus a 4 ounce base means that all volumns are to be converted to equivalent volumn at 4 ounces above the atmospheric. It is arbitrary practice in gas metering 14.4 pounds atmospheric pressure, and a 4 ounce base would give an absolute pressure of 14.65 pounds.

Pressure Control.—The adjustment of pressures within a well to obtain the most efficient and economical utilization of the energy in the natural gas under pressure in the oil sands. The proper manipulation of well pressures in order to produce a maximum amount of oil with a minimum amount of gas, thereby increasing both the ultimate flowing production and ultimate oil recovery from a sand, also in controlling the amount of water which may enter a well. This

can be accomplished by holding pressure at the well-head when the flow is directed through tubing, by raising or lowering the tubing, by changing the size of tubing by installing a flow-nipple or restricting the opening at the bottom of the tubing, by using combination strings of different sizes of tubing, or, by a combination of the different methods.

Pressure Drive.—A method of driving oil to surrounding wells by pumping air, water, or gas into the sand through other wells.

Pressure Filter.—A filter in which the liquid to be filtered is forced through filtering material by a pressure greater than its own weight in the filter. See filter press.

Prime City Naphtha.—A petroleum product which possessed a gravity of from 73° to 68° BAUME; it was used for sponge-lamps.

Prime White Oil.—A kerosene of prime white color, that is intermediate in color between waterwhite and standard white.

Producers' Stock. — Includes petroleum on producing properties (lease storage).

Production.—A term used in related senses to indicate that phase of the petroleum industry that deals with the extraction of the oil and gas from the ground; the amount of oil produced, viz: daily production, monthly production, flush production, settled production, to buy production and the like.

Production Curves.—Curves plotted for individual wells, for pools, or for fields, showing the rate of production at successive periods of time; made particularly for the purpose of studying the rate of decline of wells and pools.

Propane.—$C_3 H_8$ a gaseous paraffin found in natural gas.

Prospect.—To search for oil, either by looking for surface indications, such as seeps and anticlines, or by drilling, or by both methods.

Proven Territory.—Territory that has been definitely demonstrated to be productive or non-productive by actual drilling. Commonly used to denote the former.

Puking.—Used in refinery parlance to denote the boiling over of a still, in which the crude charge mixes with distillate and generally contaminates the contents of a run-down tank.

Pulley.—A wheel over which a belt or rope passes for the purpose of transmitting power to or from the pulley or to some other pulley.

Pulling Casing.—Removing pipe from a well.

Pulling Machine.—A portable derrick, pole or mast which is provided with pulleys, winch and necessary apparatus to be used in pulling tubing or rods from a well.

Pulling Wells.—It is necessary to abandon a well when it will not produce in paying quantity. The casing and equipment is recovered. This is called "Pulling the well".

Pulmotor.—A mechanical device designed to perform artificial respiration in cases of asphyxia, electric shock, drowning, etc., by exhausting the lungs and filling them with oxygen-enriched air.

Pump.—Any of numerous devices or machine for raising, transferring, or compressing liquids or gases by suction or pressure or both. To work or raise water, etc.

Pump Centrifugal.—A pump with high speed propeller which utilizes centrifugal force.

Pump, Deep Well.—A pump having a very long, stroke adapted for deep artesian water wells, the steam cylinder being above the well and connected by a long piston rod to the water cylinder down in the well casing near water level.

Pump, Double Acting.—A pump cylinder which discharges twice during the cycle or revolution.

Pump, Duplex.—A pump which has duplicate cylinders.

Pump Jack.—A device for operating oil well pumps by power and to which the pumps are connected.

Pump, Jet.—A kind of an ejector used for discharging a stream by means of a small high pressure jet.

Pump Lift.—The distance to which the pump can suck up water vertically from a well. Theoretically this should be about 34 feet at sea-level, but practically the limit is about 26 feet.

Pump, Low Down.—A horizontal hand pump.

Pump, Reciprocating.—A pump which has parts that alternately move in one direction and then in the reverse direction.

Pump Rod.—See: SUCKER ROD.

Pump, Rotary.—A pump which has rotating parts, but which is positive in action, not depending upon centrifugal force.

Pump, Simplex.—A pump with only one cylinder.

Pump, Single Acting.—A pump cylinder which discharges one time during the cycle or the revolution.

Pump Station.—A pumping plant stationed at necessary intervals along the course of a pipe line for the purpose of forcing the oil through the lines; or pumping plant for any purpose such as water supply, oil gathering, etc.

Pumper.—A workman who operates an oil well; also an oil producing well which does not flow its production.

Pumping Gear.—A reduction gear used to operate a walking beam of a pumping well.

Pumping Out Pan.—A shallow, open top form of condenser box.

Pumping Power.—A machine designed to operate two or more wells from one prime mover.

Putty Oil.—Concrete form oil used for mixing putty.

Pycnometer.—A vial of fixed capacity used to determine the specific gravity of fluids; also found to be spelled "Pyknometer."

Pyrene.—A hydrocarbon C_{16} H_{10} obtained from coal tar.

Pyridine.—A coal tar product in phenol oil. Principal use is as a denaturant for industrial alcohol.

Pyrobitumen.—A dark, colored, solid, infusible, naturally occurring hydrocarbon complex, often associated with a mineral matrix, insoluble in water, and relatively insoluble in carbon disulphide, benzol, etc. Pyrobitumens are derived from the metamorphosis of vegetable growth (e. g., peat, lignite, bituminous coal and anthracite coal), and from the metamorphosis of asphalts (e. g., elaterite or wurtzilite, albertite and impsonite).

Pyrogallate of Soda.—Used in gas analysis apparatus for the determination of free oxygen in the gas.

Pyrogallic Acid.—A light, white, odorless, powder or needles or leaflets which decompose at 293° C, very soluble in water, alcohol or ether. It is used as a reagent chiefly to absorb oxygen in testing for air content in natural gas or flue gases.

Pyrogenic Decomposition.—Breaking down the petroleum hydrocarbons by the application of high temperatures. Many of the hydrocarbons are broken down into simpler and lighter compounds.

Pyrogenic Distillation.—Cracking distillation at high temperatures, high pressures, or both, to obtain greater yields of the lighter hydrocarbons composing pressures, or both, to obtain greater yeilds of the lighter hydrocarbons composing gasoline.

Pyrometer.—An instrument for measuring high temperatures.

Pyrometry.—The art of measuring degrees of heat; the art of using a pyrometer.

Pyronaphtha.—Heavy illuminating oil and solar oil from Russia petroleum, having a light yellow color and specific gravity of 0.840.

Q

Quenching Bath.—A bath consisting of oil or water solution for hardening steel.

Quenching Oils.—Oils used for quenching steel in the hardening process. Mineral oils, fish oils, animal oils, or compounds of these various oils are used.

Quenching Steel.—Steel is hardened by heating it to critical temperature and then plunging it into a quenching bath composed of water, a salt solution or oil.

Quick Lime.—Burned lime rock which has not been subjected to water or moisture.

Quintal.—The metric quintal equals one-tenth of a metric ton.

R

Race.—The annular ring forming the outside member of a ball or roller bearing.

Rack.—Equipment for loading and filling tank cars at the refinery. Loading racks. A straight way with teeth which mesh with a gear pinion, used to move a part of a machine, close a large valve, or feed a carriage of a lathe.

Radial Engine.—A type of air-cooled aeronautic engine with the cylinders radially disposed around the crankshaft, the cylinders all lying in one or two planes.

Radial Load.—A load at right angles to the shaft; the load caused by weight and belt pull.

Radicals.—A radical is an atom or a group of atoms forming the chief constituents of the molecule of a compound. A radical is composed of a group of atoms. The names of radicals with the exception of amidogen, cyanogen and ammonium all terminate with the letters YL, thus we have the radicals HYDROXYL, PHOSPHORYL, etc. Pertaining to roots of numbers.

Radicals of Fixed Oils.—All fixed oils are combinations of alcohol radicals and fatty acid radicals. The alcohol radicals occurring in the vegetable oils and many of the animal oils is glyceryl ($C_3 H_5$), which is tri-valent and which therefore combines with three fatty acid radicals.

Radiation.—Loss of heat by the emission from the surfaces, through the ether but independent of the conduction of the surrounding air.

Radiator.—A device arranged for the dissipation of heat to the outer air. The amount of heat radiated depends upon the nature of the surface, its color, the area of the exposed surface and the temperature of the air. Radiation is further increased by increasing the velocity of the air over the surface.

Radioactive.—Capable of emitting spontaneously rays consisting of material particles traveling at high velocities.

Railway Freight Car Oil.—There is one summer oil and one winter oil in this class. The viscosity of the summer oil is between 50″ and 60″ Saybolt Universal at 210° F. The winter oil tests between 45″ and 55″. There is also a special car oil. A black summer oil of 50″ to 75″ Saybolt Universal mixed with red lead or graphite to form a protective coating for the journal while the car is standing idle on the side track.

Railway Grease.—Railway greases are divided into the following classes: Axle or Box grease, Cup greases, Rod greases, Track and Curve grease, Gear grease.

Railway Journal Box Grease.—A special grease used for packing the journal boxes of cars. Oil soaked waste is now more used than grease for this purpose.

Rancidity.—Certain fixed oils of vegetable or animal origin decompose or become "rancid" on prolonged exposure to air, heat and moisture. They have a rank smell that unfits them for use, and in the case of cutting oils this rancidity may be actually dangerous, because of its liability of causing infections in cuts or bruises of persons using the oils. The decomposition in most cases is due to bacteria which start growing in the oil under proper conditions of temperature.

Rape Oil.—A fixed oil of excellent lubricating quality obtained by pressing rape seed. It is much used in Europe for general machine lubrication in place of mineral oils, and does not readily become rancid when properly treated. It can be used for lubrication in its pure state, or can be mixed with mineral oils in any proportion to form compounded oils of high grade. The viscosity can be increased by blowing to over 300″ Saybolt Universal. It is sometimes known as "Colza oil."

Rasp.—An instrument used at oil wells for reducing the size of the box or collar on lost tools in preparation for the use of fishing tools. A type of rough or coarse file.

Rat Hole.—A slanting hole located just inside and near a far corner of the derrick. It is cased with a large size length of casing and is about 25 ft. deep. This forms a depository for the grief stem so that the swivel which connects to the upper end of same can be conveniently adjusted and lubricated, and provide a place out of the way for these parts when drill pipe or casing is being run into the well.

Reaction.—The action of one chemical substance upon another, accompanied by the formation of a new substance.

Reactions, Chemical.—A chemical reaction is a change in the chemical composition of matter caused by the combination of atoms with other atoms to form new molecules. Thus, in acid combines with an alkaline substance or metal to form a third substance known as a "salt" and changes can also be brought about by raising the temperature of the substance to a point where changes take place in the molecule. The changes can be analytical, in which a compound is broken down into simpler compounds or the elements, or synthetical in which simple elements combine to make more complex compounds, or else a combination of both methods.

Reagents.—Chemicals used in making analysis and for producing certain results in the examination such as precipitation, solution, etc. Each of the reagents (chemicals) has a known effect upon certain elements and compounds, and it is by observing the effect of the reagents upon these compounds that the identity of the constituents becomes known. The reagent is a substance capable of causing a chemical reaction with another.

Ream.—In drilling to enlarge a hole already drilled, to permit the entrance of casing. In machine work to rotate a cutting tool called a reamer for the purpose of enlarging or finishing a hole. In stationery 480 to 500 sheets of paper.

Reamer.—A tool with expanding cutters or lugs, used to enlarge a well hole. A tool used by a machinist to finish or enlarge a hole in metal.

Reaumer.—Thermometer scale with 0° as the freezing point of water and 80° as the boiling point. Degrees Reaumer = Degrees Centigrade x 475 (Degrees Fahrenheit — 32 x 4/9).

Recalescence.—When steel is heated to a critical temperature called the "decalescence" point, the perlite carbon is converted into cementite or hardening carbon. When cooled slowly a critical point is reached at which the cementite returns to its original pearlite form, and the temperature at which this return takes place is the "recalescent" point.

Receiver.—A tank or vessel used to receive gas, steam or other fluid for temporary storage as a receiver between the high and low pressure cylinders of an engine, or one to receive gas, or air discharged from a compressor.

Rectify.—To purify by repeated distillation. To convert alternating electric current to direct current.

Reclamation of Oil.—Used oils are reclaimed by redistillation, chemical treatment, filtration, centrifuging or a combination of these methods. The suspended solid carbon is removed, the emulsions are broken up, and the oil is returned to its former color and physical condition.

Reconnaissance.—A preliminary geological survey. A preliminary examination of a region.

Recovered Acid.—Sulphuric acid which has been used for treating oil and recovered for repeated use.

Recovered Oils.—For reasons of economy, used lubricating oils are collected and used again after purification, usually filtration. Such "recovered oils" are often darker in color than the original oils, but, when the purification has been carried out in an efficient filter, are said to be equally satisfactory.

Recovery Gas-Oil Ratio.—A number of cubic feet of gas produced from the reservoir per barrel of oil.

Recycling.—A process in which gas received from an oil well is returned to the oil sand through another well and thus repeatedly completes a cycle from the oil well, to the pressure well through the oil sand and back to the well.

Red Engine Oil.—A petroleum product used to lubricate bearings and sometimes cylinders of engines and compressors. It is a blend of red machine oil and filtered steam cylinder stocks or a mixture of red oil with 5% to 20% unblown fixed oil produces a series of engine oil.

Red Machine Oil.—This is a petroleum product used to lubricate bearings, spindles, etc. See: Red Engine Oil.

Red Oil, Elaine.—This is a fixed animal oil which is nearly pure oleic acid. It is a ruby colored semi-solid oil somewhat resembling tallow. Red oil is made by decomposing solid fat and collecting the free fatty acids, thus it is a by-product in the manufacture of glycerine and stearic acid from tallow. Owing to its purity, it is also called "Oleic acid," which can be obtained as either a "saponified" or "distilled" type.

Reduce.—To deprive of oxygen. To distill off lighter oils to obtain oils of gravity or viscosity.

Reduced Oils.—Crude oils from which the most volatile oils have been distilled. Heavy lubricating oils or other high boiling point fractions which have been distilled in vacuum and separated from their wax content by filtration. Residual oils produced from crude petroleum by the removal of water and the more volatile oil constituents, without chemically altering the base by cracking or other means.

Reducer.—A pipe coupling having a larger size on one end than at the other. Used to connect pipes of different sizes.

Reducing Still.—A still of the cheesebox or horizontal type equipped with perforated bottom steam coils.

Reducing Elbow.—A reducing elbow decreases in diameter toward the small end. Used as a reducer on a turn.

Reducing Tee.—Any tee having two different sizes of openings. It may reduce on the run, or branch. In specifying a reducing tee it is customary to give the sizes of the run connections first and the side outlet last.

Reducing Valve.—A spring or lever-loaded valve, similar to a safety valve, whereby a lower and constant pressure may be maintained beyond the valve. Also called "pressure regulator."

Reduction Gear.—A gear train arranged for reducing the speed of the driving power shaft for a more suitable speed for the driven machine.

Reduction Ratio.—The ratio of the driving speed to the driven speed in a reducing gear given by whole numbers as 5, 4, 7, 10, etc.

Redwood-Baringer Water Finder.—An instrument designed to ascertain the presence and quantity of water in a tank containing oil.

Redwood Viscosimeter.—The standard viscosimeter of Great Britain. The original instrument was jacketed type with an agate nozzle in which the time required for the efflux of 50 cubic centimeters were taken as the Redwood number. The time is taken in seconds. The rape oil unit is also used to some extent, this being taken as standard of comparison based on the viscosity of refined rape oil at 60° F. This value is accepted at 100 units. The later type of Redwood viscosimeter, known as the "Admiralty type" has a larger agate nozzle and is designed to discharge the 50 c. c. in exactly one-tenth the time of the original unit. This instrument is specially adapted for determining the viscosity of contract fuel oils, used in the British navy.

Refine.—To free from, to cleanse, to treat cast-iron in refinery furnace so as to remove the silicon.

Refined Tar.—A tar freed from water by evaporation of distillation which is continued until the residue is of desired consistency, or a product produced by fluxing tar residuum with a tar distillate.

Refined Wax.—Sweated wax which has been filtered and decolorized with Fuller's earth.

Refinery.—A factory which separates from crude petroleum the many petroleum products which are to be found upon the market. Some refineries make only the most simple products such as may be separated with straight distillation, others blend, and compound petroleum products with other elements and materials.

Refining.—The manufacture of petroleum products by a process of distillation from crude petroleum in which successive components are vaporized and separately condensed. The resultant distillates are then redistilled or chemically purified to yield the finished products of commerce. Freeing from impurities. Reducing to a fine unmixed or free state. Does not include blending. The purification of crude

metallic products as the refining of base bullion (silver head) produces nearly pure lead and silver.

Refining Methods.—For many years all products were of the "straight-run" type obtained by distillation of low pressures and temperatures, but because of the demand for gasoline the yield of this product caused a decided change in the method of refining, and the old straight-run processes gave way to the more modern high temperature and high pressure "cracking" processes which greatly increased the yield of gasoline. There are a number of patented details in the refining of petroleum such as Edenleanu, Engler Holde, Guillard, Kendall, Wynne, etc., but in general the general process remains the same in regard to distillation.

Refluxing.—Flowing back.

Refract.—To turn the rays of light out of a direct course by passing them through glass lenses or prisms.

Refraction.—A change of direction which takes place when a ray of light passes from one medium to another of different density.

Refractive Index.—An index used for the detection of rosin in mineral oils.

Refractometer.—An instrument for measuring the refractive index of light when examining oils for impurity or identification. The Abbe refractometer is particularly adapted for determining rosin oil in petroleum oil.

Refrigerant.—Any substance that can be used for the absorption of heat from surrounding objects and hence for a reduction in their temperature.

Refrigeration.—The process of refrigeration consists in the removal of heat from the object to be cooled. Cold is the relative absence of heat and not a specific property. The amount of heat removed depends upon the total reduction in temperature and the specific heat of the body which the heat is being removed. If the body has a high specific heat as is the case with water, then a great quantity of heat must be handled to reduce it one degree in temperature. Metals which have a relatively low specific heat require a smaller amount of refrigerating effect. In all refrigeration systems advantage is taken of the fact that a sudden expansion of a gas is accompanied by a sudden drop in temperature. Thus, when a nozzle is discharging air into a zone of lower pressure, the gas expands and in so doing, takes heat from surrounding objects for the expansion.

Refrigeration, Absorption System.—Instead of using a compressor, the returning ammonia gas is led into a tank of water where it is absorbed by the water. On heating the solution the ammonia gas is driven off under pressure and is liquified by cooling in a condenser. The liquified ammonia is now led to the expansion valves as before, and the gas returns to a second tank for absorption.

Refrigeration, Compression System.—In this system ammonia gas, carbon diozide or sulphur dioxide gases are compressed and cooled to their liquefaction pressure. The liquid is now led to the point where the cooling effect is to be obtained and expanded through a nozzle known as an "expansion valve." Chilling or freezing takes place, and the gas is then led back to the compressor for re-compression. This completes the cycle operation .

Regulator, Pressure.—A valve with diaphram which controls the flow of gas depending upon the pressure on the low side to control the flow.

Reins.—The links of a pair of jars. Instruments for control.

Rerun Oil.—Oil which has been re-distilled.

Resection.—Term in surveying; one of four ways of locating a station. The others are radiation, intersection and traversing.

Reservoir.—A rock sufficiently porous to serve as a place of accumulation of oil or gas; a place where liquids or gas may be stored. There are natural reservoirs below surface filled with fluids, and artificial reservoirs for water upon the surface of the earth.

Reservoir Gas-Oil Ratio.—The number of cubic feet of gas per barrel of oil originally in the reservoir.

Residual.—A heavy oil left in the stills after distillation. That which remains after part has been taken away.

Residual Pitches.—The solid residual pitches which are used for highway construction.

Residue.—The solid matter remaining after the extraction of the oil from crude material in a standard laboratory distillation, the amount of original liquid remaining in the distilling flask when the distillation is completed.

Residues.—The residue consisting of solid and semisolid matter obtained by distillation of crude oil after the constituents boiling below 300° F. have been removed. This is then treated for the removal of paraffine wax, vaseline and lubricating oils, and in the case of asphaltic base crudes, the asphaltum, etc. In "topping" plants the entire residue is sold for fuel oil.

Residuum.—The residue obtained on the distillation of crude petroleum after the constituents boiling below 620° F. have been removed. The yield of residuum from Pennsylvania petroleum amounts to 12-14 per cent.

Resin.—The generic term covering saponifiable materials found in oils, with the exception of fatty and sulphuric acids. Erroneously applied to solid bitumens. Also applied to secretions from certain plants or trees.

Resin Oil.—An oil obtained by the destructive distillation of resin, the vapors of which are condensed to crude resin oil, a brown viscous liquid. It has a peculiar bluish-voilet bloom or flourescence which is like that of a petroleum oil, but wholly unlike that of vegetable, oils in general. Further heating of the oil drives off the more volatile matter and produces the finished oil.

Resinous Substance.—A term applied to substances containing true resins; or to substances of variable origin and composition resembling true resins in their physical properties with the exception of color and solubility.

Resistance.—Opposition to or resisting the action of a force in producing motion or flow. Resistance in mechanics is represented by friction, in electricity by its opposition to the flow of current. The

combination of motion or flow with resistance results in the production of heat, the mechanical or electrical energy being converted into the form of heat energy.

Retene.—A crystalline hydrocarbon C_{18} H_{18} found in certain regions.

Retinic Acid.—A general name applied to various resins, especially those from beds of brown coal, which are near succinite in appearance, but contain little or no suxcinic acid.

Retort.—A vessel or chamber in which matter is vaporized or gasified by the application of heat. A retort is distinguished from a still in that it is more often used for the treatment of solid or semi-solid substances.

Retort Gas.—Heating and power gas obtained by distilling coal in a retort, the volatile hydrocarbons of the coal (Tarry matter) being vaporized and driven off in the form of vapors and fixed gases.

Return Bend.—A pipe fitting equal to two "ells," used to connect parallel pipes so that fluid flowing into one will be in a return direction to the other. A "V" bend.

Return Tubular.—A type of boiler in which the hot gas first passes under the shell and then returns through the tubes.

Reussinite.—A resin-like, reddish brown oxygenated hydrocarbon, soluble in boiling alcohol and in ether.

Reversal.—A dip in the direction opposite to the normal dip.

Reverse.—A fault in which the hanging wall has been raised relatively to the foot wall.

Revolution.—A revolution is one complete turn of a wheel or shaft. The rate of turning is generally specified either as revolutions per minute or revolutions per second. It is also known as "angular velocity," or "rotative frequency." A complete cycle. A pump is said to make a revolution when both the forward and return stroke have been completed, or when the beam has returned to end of the travel from which it started.

Rezilite Mastic.—A preparation of elaterite, containing some asbestos fibre; it is used for surfacing floors.

Rhigolene.—The most volatile liquid fraction obtained in the distillation of petroleum. It has a boiling point at 18° C. and consists largely of pentane. Its specific gravity is 0.60. The term rhigolene has also been applied to the product described under cymogene; specific gravity, 0.625 to 0.636. Crude naphtha from Pennsylvania petroleum yields about 0.1 per cent of such rhigolene.

Rig.—The derrick and auxiliary structure necessary before drilling of a well can be started. The complete equipment of a drilling or a pumping well. To prepare for drilling by installing lines and tools .

Rigging Up.—Before the work of drilling can be started, but after the derrick has been built a boiler, engine tools and machinery must be installed and a supply of fuel and water must be established. This operation which in substance is that of getting the rig ready, is conveniently described by the drillers' term "rigging up."

Right Regular Lay Cable.—A cable with individual wires laid to the left to form strands and the strands are laid to the right to form the cable.

Ring Compounds.—Certain of the hydrocarbon compounds in which the carbon atoms form a closed ring. Compounds of the ring type are known as the "Aromatics," of which benzol, toluene, naphthalene and anthracene are examples. A small percentage of the aromatics are found in most petroleums but in far smaller quantity than in most paraffin or "saturated compounds." They are more greatly in evidence with cracked oils developed by pyrogenic decomposition. The ring compounds are "unsaturated," that is, there are not sufficient hydrogen atoms present to complete the valency.

Ring Gage.—A ring used in the measurement of crushed materials, the size being indicated by the diameter of the ring opening through which the material passes. A ring used to determine when a drill is dressed to proper size.

Road-Binders.—Asphalt, cold tar, or residum used to consolidate the rock fragments on the surface of roads.

Road Oil.—An oil used as a dust layer and binder on macadam and earth roads. A residual petroleum oil taken from the stills. The quantity and quality is increased by blowing air through the residue in the stills, and in most cases these oils are dehydrated. Parafline wax is objectionable as it destroys the cementing value of the asphaltic content and therefore should be as low as possible. The true binder is the asphaltum and other bituminous compounds, hence, the road oil should be obtained from the crudes containing a considerable percentage of natural asphaltum.

Rock.—A natural mineral consisting largely of calcium oxides and carbonates, together with some silica and magnesium salts. The composition is extremely variable even among stone in the same bed, and in many cases there are oxides and salts of other materials imbedded in the main body of the rock.

Rock Asphalt.—Sandstone or limestone naturally impregnated with asphalt.

Rock Asphalt Pavement.—A wearing course composed of broken or pulverized rock asphalt, with or without the addition of other bituminous materials.

Rock Bit.—A special drill bit designed to cut hard rock. It is of various design, but makes use of very hard metal to do the cutting. Knurled cones are popular in the design of rock bits.

Rock Drills.—Steam or compressed air reciprocating hammers used for driving a bit into stone. Used in quarries, railroad construction, etc., any drill designed to penetrate rock.

Rock Gas.—Natural gas.

Rock Hound.—Slang for PETROLEUM GEOLOGIST, not generally approved by the men of the profession.

Rock Oil.—A name for liquid petroleum.

Rock Pressure.—A term referring to the initial pressure of a gas well. Usually it approximates the pressure exerted by a column of fresh water of a height equal to the depth of the gas sand below the surface.

Rock, Sedimentary.—Rock composed of fine sand or sediment compressed to form a porous structure capable of absorbing and holding oil and water.

Rock Tar.—Crude Petroleum.

Rocking the Well.—The pressure required to start a well flowing by gas lift is two to five times that needed when the well is in normal operation. This is because the column of fluid in the well, being unsaturated is much more dense than the mixture of oil and gas that flows after regular production has been established. To keep this starting pressure at as low a point as possible, to avoid forcing oil back into the formation, the casinghead sometimes is equipped to reverse the flow of gas down into the well. Thus it is possible to force gas first down the tubing and then down between the tubing and casing. Several of these reversals of the gas are required sometimes to get the well started. This manipulation of the gas flow is called rocking the well because of its back-and-forth character.

Rod.—A long, slender, rigid bar.

Rod, Connecting.—A rod connecting the cross-head of an engine or locomotive to the crank or crankpins on the drivers. It converts reciprocating motion of the piston into the rotary motion of the crank or wheels. Similar to a pitman.

Rod, Eccentric.—The rods connecting the eccentrics of a steam engine or gas engine to the valves or valve motion. They are connecting links between the rotating and reciprocating motions.

Rod Elevator.—A steel block with opening and latching device for the entrance of a sucker rod, and provided with two long links to suspend from the elevator hook when running sucker rods into a well for pumping.

Rod Grease.—A hard grease used on locomotives for the lubrication of the connecting rod ends in compression cups.

Rod Guide.—An attachment to pump sucker rods in oil wells which serves to prevent the rod from oscillating, knocking, and rubbing on the sides of the tubing.

Rod Packing.—Fibrous material or rings placed around the piston rod at the point where it passes through the cylinder head to prevent the leakage of steam or gases along the rod. Material contained in a stuffing box packs the polish rod of a pumping well.

Rod Packing Gland.—A flanged ring which fits loosely upon a polished rod, a valve stem or a piston rod, and which is forced against the packing within the stuffing box.

Rod, Piston.—A long smooth, slender cylindrical rod connected at one end to the piston of an engine or pump and to the cross-head or sliding guide at the other end.

Rod, Thief.—A long rod used in taking oil samples from a storage tank or tank car.

Rod Wax.—A light-yellow pastry mass consisting of an emulsion of high boiling oils with solid hydrocarbons; it collects in considerable quantities around the rods and casing in some of the Pennsylvania wells.

Rodman or Rodsman.—One who carries a surveyor's leveling or transit rod.

Roll Oil.—Used in the cold rolling of brass, copper and similar soft metals. It is about the same as the RED ENGINE OIL used for general lubrication.

Roller Bearings.—A form of anti-friction bearing consisting of small cylindrical rollers placed around the shaft, the rollers fitting and rolling in the outer "race" or track. This is a true rolling motion without rubbing. Cone type roller bearings use conical steel rollers to take up end thrust on the shaft as well as the radial load or direct weight of the shaft. There are several manufacturers whose names have become a prefix in describing the bearing. Some of these are Hyatt, and Timken.

Roller Feed.—Feeding sheet or wire into a machine by means of rollers.

Rolling Mill.—The equipment for rolling steel beams, rails, rods, bars, sheets and plates by the forging process. A heated plastic steel billet is gradually squeezed into the desired form by successive passes through grooves. The rollers are arranged exactly like the rollers of a wash wringer and pull the steel through and squeeze it just as the wringer roller squeezes the cloth.

Rolling Mill Train.—The successive rolling units, starting with the "roughing or cogging rolls" and ending at the "finishing rolls" is called the "roll train".

Rolls, Crushing.—Rolls used for crushing or flattening. Used for crushing stone, slag, cement, etc., or for flattening and breaking up corn, wheat or oats.

Rolls, Forging.—Steel rolls used for squeezing hot plastic metal into bars, sheets, rails and beams.

Rolly Oil.—Crude oil that has formed a more or less complete emulsion with water.

Rope Drilling.—Drilling in the ground with a bit attached to the end of a rope to which a twisting motion is given. Sometimes called jump drilling, as a rope with the bit is raised and dropped.

Rope Drive.—A system of power transmission in which ropes are used in place of flat leather belts. Manila ropes are used for inside drives and steel cables for long span outdoor drives.

Rope Drive, American.—A rope drive system in which the rope strands are in a continuous length the same rope being wrapped around the pulleys or "sheaves" until the proper number of strands is obtained for transmitting the power. This system uses a tension carriage to take up the stretch of the rope, and at the same time the rope is transferred across to the beginning side of the sheave pulleys and thus the circuit is completed.

Rope Drive, English.—A separate endless rope is used for each groove in the sheaves. There is no provision to take up the stretch of the ropes unless one of the machines or sheaves can be adjusted and thus change the distance between centers.

Rope Grab.—See: Rope spear.

Rope Knife.—A tool used for cutting the drilling rope in the hole.

Rope Sheaves.—Grooved pulleys for hoisting or power transmission.

Rope Socket.—A hole formed like the frustrum of a cone through which the frayed end of a wire rope is placed and then filled with molten metal, lead, tin, zinc or antimony.

Rope Spear.—A fishing tool used in cable drilling for fishing up a broken cable, also called rope grab.

Rope Worm.—Appliance used in cable drilling when drawing rope out of the tubing.

Rosin.—The resinous consituent of the oleo-resin exuded by various species of rope, and known in commerce as crude turpentine.

Rosin Oils.—Heavy rosin oils, boiling above 300°C., are produced by the destructive distillation of colophone, light rosin spirit or pinolin coming over in the first runnings; they may contain, when crude, up to 30 per cent of rosin acids. Crude and refined rosin oils find application as electrical insulators, and in the manufacture of lubricants, varnishes, and water-soluble oils.

Rosin Oil Adulterant.—A viscous neutral oil of the gravity 32° Be. and the viscosity 145, and a non-viscous neutral oil of a grade identical with concrete from oil, have both been much used to replace rosin oil.

Rosthornite.—A resin C_{24} H_{40} O possessing a brown color and a specific gravity of 1.076, found at Sonnberg, Carinthia.

Rotary.—The turntable used to rotate the pipe in a rotary rig. A fault in which some straight lines on opposite sides of the fault and outside of the dislocated zone, parallel before the displacement, are no longer parallel, that is, where one side has suffered a rotation relative to the other.

Rotary Aviation Engine.—An air-cooled internal combustion engine in which the cylinders are arranged radially around the shaft, the cylinders revolving while the crank-shaft stands still. Examples are the Gnome, LeRhone and Bucher. Such engines can be made very light, but are exceedingly wasteful of lubrication because of its ability to stand up under the high temperature, but petroleum oils have also been developed.

Rotary Drilling.—The hydraulic process of drilling consists of rotating a column of drill pipe, to the bottom of which is attached a rotary drilling bit, and during the operation, circulating through the pipe a current of mud-laden fluid, under pressure, by means of special slush pumps.

Rotary Engine.—Any type of engine in which the parts have a truly rotary motion without the introduction of reciprocating parts.

Rotary Hose.—Flexible pipe connecting the slush pump to the swivel.

Rotary Machine.—The rotating table and driving parts which operate the drill pipe in the process of drilling by the rotary method.

Rotary Pump.—A pump of the gear or rotating vane type used for moving liquids. This class of rotary is known as a "Positive-rotary" as each revolution moves an exact and definite amount of fluid. The

gear-type pump, consisting of two meshed gears in an oblong housing, is much used for supplying oil in a pressure feed lubrication system. The siding vane rotary is also used for the same purpose. Not a centrifugal pump.

Rotary Swivel.—See swivel neck.

Rotary System.—The method of drilling which depends for its effectiveness on a rotating type of bit, and constant circulation of mud to remove the drilling and to plaster and consolidate the walls of the hole.

Rotary Table Rotary.—The geared rotating table which propels the drill stem when drilling a well by the rotary method.

Rotary Valve.—Rotating valves for controlling the intake and exhaust gases of gasoline engines.

Rotor.—A revolving or rotating part of a machine referring to the stationary part called the stator. Applied particularly to an electric generator or motor.

Rounding.—Cutting down the raw material to approximately finished size.

Roughing Cut.—The first heavy series of cuts taken by a machine tool on the raw material to get the material down to approximate size before the final finishing cut is taken to dimensions.

Roughing Cut Oil.—A cutting compound or coolant having exceptional heat removing qualities used for lubricating the tools during the roughing cut.

Royalty.—The part of the oil or gas paid to the land owner or to one who has acquired possession of the royalty rights. The amount paid by the lessee or operator to the owner of the property worked, based on a certain amount per ton or a percentage on production. A royalty right can be bought and sold independent of surface rights. The owner of the right is generally paid in cash by American oil operators.

Royalty Interest.—The share of minerals reserved, free of expense to the lessor.

Rubbing Oil.—A non-viscuous neutral oil used for polishing woodwork, furniture, etc. Same as CONCRETE FORM OIL.

Run.—Oil taken from or by a pipeline. Applied to oil piped from one place to another; as pipe-line during a specified time as a day or month.

Runback.—Pipes through which the condensate is returned to the still instead of being drawn off.

Run-Down.—Distillation of an oil down to the solid residuals.

Run Down Tanks.—Tanks in which distillation products are first received; receiving tanks.

Running Clearance.—The space left between a journal and the bearing allowed for the thickness of the lubricating film. The clearance space increases with the diameter of the parts.

Running To Coke.—Distillation of all crude oil fractions down to the solid coke.

Rust.—Iron oxide (Ferrous), red soft substances caused by the exposure of iron or steel to water or damp air.

Rust Greases.—Rust preventives made from petroleum oils with such solid matter as whiting, waxes, etc. See SLUSHING OIL.

Rust Preventives.—Any adherent waterproof coating capable of excluding water and moist air from a metal surface .

S

Saddle Flange.—A flange shaped for bolting on a convex surface, and as an outlet to a boiler or a tank.

Saddle, Pipe.—A fitting made in parts to clamp onto a pipe for the purpose of stopping a leak or providing an outlet.

Safety Board.—A board used in a derrick for a man to stand upon when handling elevators. They are designated as single, double, triple and quadruple which means that they are placed at suitable heights for stands of drill pipe of that number of joints.

Safety Chains.—Steel chains hanging from the chassis of a tank wagon to the pavement to ground and thus eliminate static electricity caused by the friction of the tiers on the pavement.

Safety Factor.—The relation of the ultimate strength to the stresses actually acting on a structure, or the number of times the ultimate strength exceeds the safe load. The safe load is about ¼ the ultimate strength, and when so considered the safety factor is 4.

Safety Latch.—A latch provided in a hook or elevator to prevent it from becoming detached prematurely.

Safety Platform.—A platform on a derrick provided for the safe landing and working place for men who must be up the derrick to handle elevators, casing rods, etc. These platforms are designated as single double, triple, quadruple and crown.

Safety Plug.—A fusible plug placed in the crown sheet of a boiler. It fuses and allows steam to escape when water is too low.

Safety Valve.—An automatic device used for the release of steam, gaseous, or liquid pressure when a certain limiting pressure is exceeded.

Saint Quirinus Oil.—Petroleum used medicinally in Germany as early as 1436, the supply coming from the Tegernsee district of Bavaria.

Saline.—Possessing a salt like character; having the taste of common salt.

Salt Brine.—A solution of a salt in water, commonly considered as a solution of sodium chloride (Table salt). See: Brine.

Salt Dome.—A dome like structure formed in rock strata, the core or central portion of which is rock salt. Found in the Gulf Coast fields and often forming reservoirs for oil. They are irregular in shape, either oval or round and sometimes do not appear above the surface of the surrounding land. The size is from ¼ to 1½ miles across. Oil is found on, or surrounding many such domes.

Salt Water Wells.—Wells "gone to salt water", flowing salt water after the petroleum contents have become exhausted. The appearance of salt water is generally a signal that the petroleum production is nearing an end.

Salting.—Fraudulent introduction of enrichment of values in a prospect, to aid the sale or promotion of same.

Salve.—An unctuous semi-solid used as an ointment, generally based on petrolatum.

Sample.—A small amount of oil or other materials for the determination of the properties and grade.

Sampson Post.—An upright post which supports the walking-beam, communicating motion from the engine to a pump or a string of cable tools.

Sand.—Separate grains or particles of detrital rock material, easily distinguished by the unaided eye, but not large enough to be called pebbles; also a loose mass of such grains, forming an incoherent arenaceous sediment; specifically, sandstone a technical usage.

Sand Line.—A wire line used in well drilling to raise and lower the bailer or sand pump which cleans the hole from drill cuttings.

Sand Reel.—A drum, operated by chain or a friction drive from the band wheel, used to raise or lower the sand pump or bailer.

Sand Pump.—A cylinder with a plunger inside and a valve at the bottom, lowered into a drill hole from time to time to take out the accumulated slime resulting from the action of the drill on the rock. Called also Shell Pump and Sludger. More effective for cleaning out than a bailer.

Sand Tester.—A perforated section of tubing with two packers, one above and the other below the perforations so arranged that the same when run on a string of drill pipe will permit a sample of oil or gas to be recovered from the sand body while fluid may stand in the hole.

Sands.—The oil storage formations of an oil field. With ordinary porosity one cubic foot of oil sand will contain approximately one gallon of oil, but there is a wide variation in this depending upon the porosity.

Sandstone.—Compacted and cemented sand, frequently a source of oil.

Sand Trap.—A tubular connection placed below the working barrel in a well pump for the purpose of receiving oil and liquids, but designed to exclude sand.

Saponification.—Conversion into soap; the process in which fatty substances form soap or emulsion by combination with an alkali.

Saponification Number.—The number of grams of potassium hydroxide required to saponify 1 gram of the substance.

Saponated Petroleum.—Liquid saponated petroleum may be prepared from 100 parts of liquid petrolatum 50 parts of oleic acid, and 25 parts of spirits of ammonia. Solid saponated petroleum is compounded of 100 parts of petroleum, 50 parts of oleic acid, and 25 parts of spirits of ammonia.

Saponifier.—Any compound, as a caustic alkali, used in soap-making to convert the fatty acids into soap.

Satin Gloss.—A name for lampblack.

Saturate.—To completely fill to capacity. Fully pentrated or impregnated.

Saturated.—A term applied to those hydrocarbons which do not take on additional products without giving up hydrogen especially the paraffin or asphaltic $C_n H_{2n+2}$ and polymethylene $C_n H_{2n}$ hydrocarbons.

Saturated Steam.—Steam or water vapor carrying all of the water that can be evaporated at a given temperature and pressure in "superheated" an excess in "wet" or "moist" steam.

Saturated Hydrocarbons.—Hydrocarbon series containing all of the hydrogen possible. To completely satisfy the valence of the carbon atoms. The paraffin series of hydrocarbons are saturated types.

Saybolt Chrometer.—An instrument for comparing the colors of oils or color of sample with that of a standard color. The light is reflected through a column of the sample and also through a standard colored glass. When the oil is slowly drained from the sample tube, the color gradually lightens until it matches the standard color. At this point a reading is taken from graduations marked on the side of the sample tube which gives the color number in the Saybolt scale.

Saybolt Furol Viscosity.—A standard viscosity measurement of heavy fuel oils and lubricants that lie outside the range of the Saybolt Universal Viscosimeter. Standard fuel oil test.

Saybolt Viscosimeter, Universal.—The instrument used for determining the time necessary for a liquid to flow through a special orifice.

Saybolt Viscosity.—The viscosity as determined by the original Saybolt orifice type instrument, but superseded by an improved instrument.

Scale.—The incrustation caused in steam boilers by the evaporation of water containing mineral salts. Crude paraffin obtained in petroleum refining by filtering from the heavier oils.

Scale Wax.—A wax that has all but a small percentage of the oil sweated out.

Scalp.—To remove the most valuable constituents and wasting the residuals.

Scarf.—In the manufacture of pipe, to slightly level or roll down the longitudinal edges of a steel plate, or the prepared ends of two parts of metal which are to be welded together.

Scarf.—Cliff or steep slope along the margin of a plateau, mesa, terrace or bench.

Scarf Weld.—A joint that is made by overlapping and welding together the scarfed ends or edges of metal sheets.

Scarfs.—Same as escarpment.

Scavenging Stroke.—The piston stroke that clears out the burned gas.

Schists.—Rocks that cleave easily.

Scleroscope.—An instrument for determining the hardness of metals and thereby estimating their tensile strength. The tensile strength increases in very nearly direct proportion to the hardness. There are two principal instruments now in use. The Shore and the Brinnell.

Scout.—A term frequently used for one who makes preliminary examinations of promising mining claims and prospects, as for mineral, coal, oil, etc.

Scouting.—In the geological sense, synonymous with reconnaissance work. Also employed to designate the obtaining of information concerning areas being drilled by others.

Scraper Chaser.—A man who follows the scraper by the sound it makes traveling through the lime.

Scraper, Pipe Line.—A device with metal arms that scrape the interior of a pipe line. It is propelled by the moving liquid. Also called Go-devil.

Screen Pipe.—A special perforated pipe or casing which has the perforations protected by screen used in formations of sand when needed in certain deep wells.

Screw.—A cylindrical body provided with helical groove or "thread" used for fastening or for transmitting energy. The groove or thread advances by a fixed distance for every revolution of the screw. The distance between the threads is the screw "pitch" the distance advanced is the "lead".

Screw Conveyor.—An apparatus by which materials may be transported by the action of a helical screw.

Screw Cutting Oil.—Oil adapted for heavy lathe and thread-cutting purposes is generally compounded with cottonseed oil or pure lard oil. Screw-cutting oils are often mixtures of 27° Be., paraffin and 25 per cent cottonseed oil.

Screw Jack.—A heavy screw set in a base for the purpose of movnig or lifting heavy loads.

Screw Pumps.—Rotary pumps of the Quinby type in which the liquid is displaced by two coarsely threaded rotating screws.

Screws, Standard.—The standard screw thread of the United States is the U. S. Standard thread, sides at 60 and flattened top and bottom by ⅛ the pitch. There are many standard screws depending upon the purpose for which they are used. A. P. I. Standard pipe, sucker rod, tool joint, and Briggs pipe threads are examples.

Scrubber.—An apparatus for washing and removing ammonia and light hydrocarbons from gas. A receiving tank at a gasoline plant or at a gas compressing station, designed to separate dirt, sand and liquid from gas before this material reaches the compressor.

Scrubber, Gas Engine.—A scrubbing tower or rotary scrubber employed for the removal of dust, clinker and carbon dioxide from producer-gas or blast furnace gas was employed as fuel for gas engines.

Scrubber, Tower.—For scrubbing coal gas, removing tarry matter and the remains of ammonia gas.

Sea-Drag.—A conical canvas bag filled with oil and dragged over the surface of the water to prevent waves from breaking a heavy sea. This is a safety device carried by all oceangoing ships.

Sea Wax.—Bituminous matter thrown up along seacoasts; probably resulting from partial oxidation of seaweeds. Such wax is sometimes mistaken for an indication of the presence of petroleum.

Seal.—To secure against a flow or escape of gas, air or liquid; as to seal a gas well.

Seal Coat.—A final superficial application of bituminous pavement.

Seal Oil, Mineral.—A heavy burning oil obtained during the distillation of cylinder stock and used principally as an absorbent oil for removing the gasoline vapor from natural gas. It is also used as an illuminant for some classes of work where a heavy kerosene is desirable and also as a solvent.

Seal, Piston.—To produce a gas tight "seal" or packing around a piston by introducing a viscous oil into the clearance space. It is likely that this oil seal is as effective in obtaining a gas tight fit as accurate machining.

Secunda Oil.—A solar oil obtained by shale oil distillation. Has a high gravity and boiling point.

Secondary Battery.—A storage battery or accumulator.

Secondary Coil.—The output or windings of an electrical transformer. This is the coil in which currents are induced by variations in the magnetic flux.

Sediment.—Any material other than water, which separates by itself below oil in a tank. Foreign matter, usually sand or dirt which settles to the bottom from a liquid.

Sedimentary Rocks.—Rocks formed by the compacting of sediment which contains petroleum oils.

Sedimentation.—Accumulation or deposition by water or air or vegetable or animal deposits of sediment, especially in the formation of sedimentary rocks, either aqueous or of wind-drift variety.

Seed Bag.—A packer made of flax seed that swells when it strikes water.

Seed Oils.—Obtained from seeds such as rapeseed, cottonseed, etc.

Seepage.—Flow or leakage of oil to the earth's surface.

Segment.—The surface included between an arc of a circle and a chord. The air space above the surface of a fluid in a horizontal tank is a segment. A straight line on the oil level and a circular arc above described by the tank sides.

Segregate.—To separate from others, as one group may be separated from another, although the elements of the group may be congregated.

Seize.—The binding of the parts of a bearing caused by failure of lubrication or overheating. This is due to the expansion of the heated journal coming into contact with the bearing surface or to roughening and scoring of the surfaces.

Seized Piston.—Stuck piston caused by overheating and due to deficient cooling or lubrication.

Seizing.—The binding of operating parts through failure of lubricants or overheating.

Selective Evaporation.—The partial evaporation of certain components in a compound fluid by reason of differences in their boiling points.

Semaphore.—An indicating oiling device used in a circulating system which shows whether the oil is flowing. Any movement in the oil brings a flag or target into view.

Semi-Diesel Engine.—An oil engine employing fuel oil injection but operating at a lower compression than the true Diesel engine. Ignition of the charge is generally assisted by a hot plate or bulb and is not altogether dependent upon the heat of compression.

Semi-Solid Bituminous Material.—Bituminous material showing a penetration at normal temperature under a load of 100 grams applied for 5 sec. of more than 10 and under a load of 50 grams applied for 1 sec. of not more than 350.

Seneca Oil.—Name given to a petroleum oozed out on Ohio River in what is now known as the Beaver Quadrangle, Pa.

Separator.—A machine for separating, with the aid of water or air, materials of different specific gravity. An apparatus for separating the oil mechanically carried over by the vapor in distillation. A closed steel vessel or tank of special design having interior baffles and automatic regulating valves used to separate gas in large volumes from oil as they flow from a well.

Separators, Centrifugal.—Machines used for separating liquids of different gravities by virtue of differences in the centrifugal forces developed at high speeds of rotation. The greater centrifugal force exerted upon heavy fluids causes them to concentrate at the outer edge of the rotating plane.

Separators, Cutting Oil.—A centrifugal machine for separating cutting oils from chips and metal cuttings. It is estimated that 30 pounds of cuttings will retain one gallon of cutting oil.

Separators, Oil.—Separators placed in the exhaust lines of steam engines to remove the cylinder lubricating oils when the steam is to be used in a condenser of for heating purposes.

Separators, Steam.—Apparatus for separating water from the boiler steam and placed between the boilers and the engine. They also pick up scale, rust and pipe cuttings that would be injuroius to the engine.

Set.—To fix casing definitely in the well. The condition of cement or other mixtures which were semi-liquid, but which have become solid. A tool used to calk a boiler seam, to finish a rivet heat, or to sink a nail below the surface in wood.

Setting Point.—The temperature at which liquids congeal (Set) and become solid or semi-solid. In many petroleum oils this is determined by the amount of paraffin contained in the oil which becomes solid when the temperature is reduced below a certain point.

Setting up.—The relatively quick change such as takes place in a bituminous material after its application to a roadway, indicated by its hardening after cooling and exposure to atmospheric and traffic conditions, as opposed to the slower changes later occurring gradually and almost imperceptibly.

Settled Production.—The production of an oil well or a pool which distinguishes the period when the decline rate is rather slow and the period of flush production is past. The production of an oil well which, apart from the normal progressive annual diminution, will last a number of years.

Settler.—A separator; a tub, pan, vat, or tank to which a separation can be effected by settling.

Shackel Line.—Also called rod line or pull line. A line of rods connected clamps or shackles and extended to a pumping jack from a central power plant.

Shale.—A fine-grained, fissile, argillaceous, sedimentary rock characterized by rather fragile and uneven laminae and commonly by a somewhat splintery fracture. Often but incorrectly called slate by miners, quarrymen, well drillers and others.

Shale Naphtha.—The naphtha from shale oil generally consists of 60 to 70 per cent of olefines and other hydrocarbons acted on by fuming nitric acid. It is obtained at different specific gravities and boiling points according to requirements; for instance, 0.660 for gasoline; 0.690 for motor spirit, and 0.72 to 0.75 for lighting purposes and as solvents.

Shale Oil.—Oil occurring in crevices in shale is sometimes known as shale oil. It is poor practice to use the term shale oil in this way, as it should be limited to oil extracted from shale. A highly bituminous laminated substance containing about 80 per cent of mineral matter, occurring in many parts of the world, but especially in the coal measures of the Lothians in Scotland.

Shaly.—Characteristics of, pertaining to, composed of, or resembling and fissibility of shale; as, a shaly sandstone or limestone.

Sheave.—A wheel with a grooved circumference over which a rope is turned, either for the transmission of power or for hoisting or hauling. Any grooved wheel or pulley.

Sheet.—The steel plates used in the construction of tanks, boilers, stills, etc.

Sheet Asphalt Pavement.—One having a wearing course composed of asphalt cement and sand of predetermined grading, with or without the addition of fine material, incorporated together by mixing methods.

Sheet Asphalt Roads.—The original type of pavement laid in two courses, the bottom course with large crushed stone and the top course with a mixture of sand and bitumen. Bituminous concrete pavement of the Warren type is laid with coarse stone in the wearing surface.

Shell.—Torpedo used in oil wells. A case metal or paper which holds an explosive. A thin hard band or layer of rock encountered in well drilling.

Shell Pump.—A simple form of sand pump or slugger consisting of a hollow cylinder with a ball or check valve at the bottom, used with a flush of water to remove debris.

Shims, Bearing.—Very thin sheets placed between the halves of a bearing and providing a means of bearing adjustment for wear by removing one or more of the thin sheets, thus allowing the bearing halves to close up.

Shoe.—A heavy steel ring with the end beveled on the inside and then hardened; is used as a shoe on the bottom end of a string of casing. A part of a crosshead of a compressor or an engine.

Shoestring Sands.—The thin, meandering character of a series of sand bodies in eastern Kansas provided an apt name for them, "Shoestring sands". These channel deposits presumably marking parts of the course of a prehistoric river, lie just above the Cherokee shales of the Pennsylvania line. They occupy what evidently were sharply cut channels in the shale. The shoestrings vary in width with a maximum of about half a mile. The greatest known length is about 15 miles. Most of these strings of sand are less than 50 feet thick through, in a few places they are double that.

Shooter.—In the petroleum industry, one who shoots oil wells with nitroglycerine to loosen or shatter the oil-bearing formation.

Shooting.—Exploding nitro-glycerine or other high explosive in a hole, to shatter the rock and increase the flow of oil. Same as torpedoing.

Shot.—A charge of high explosive usually nitroglycerine deposited in a well to shatter the sand and to expedite the recovery of oil. A reading taken through the teliscope of a surveying instrument.

Shot Drill.—A rotating drill which uses chilled shot as an abrasive.

Show.—The first appearance of oil from a well.

Showings.—Presence in a well, or in the bailings, of small quantities of petroleum or recognized indications thereof.

Shrinkage.—Loss of oil by evaporation during shipment. Also applied to describe settling of earthen fills such as railway grades and levee.

Shutdown.—A term denoting that work has been temporarily stopped, as on an oil well.

Shut in Pressure.—The pressure noted at the well head when the well is completely shut in. Unless the depth of fluid in the well is known, the pressure at the bottom of the well cannot be determined from the shut-in-pressure.

Shut-Off.—When a well leaks water from behind the casing, cement or mud is used to effect a shut-off.

Side Door Elevator.—An elevator with a hinged part at one side that opens to permit it to receive casing or tubing.

Silician Oils.—The first oils of the Petroleum group used before the Christian era. They are mentioned as illuminating oils in manuscripts as early as 75 B. C. Used in Agrigentum, Sicily.

Side Irons.—The iron or steel parts which make up the bearings for the walking beam and the supports for these bearings. These are bottled to the sides of the top end of the Sampson post.

Side Shot.—A branch traverse made from more accurately mapped traverse or station. The hand level method is useful in making "side shots".

Side Tracking.—Drilling past a broken drill or casing which has become permanently lodged in the hole.

Sight Feed Oil Cup.—A lubricator for engine bearings and machinery.

Signal Oil.—An oil of 20 per cent of white fish and 80 per cent of mineral seal oil, used in lanterns by railway switchmen.

Silica.—Oxide or hydroxide of silicon.

Silica Jell.—A preparation of Silica used to absorb the heavy fractions from hydrocarbon gas.

Silicate.—A salt of silicic acid.

Silicate of Carbon.—A name for lampblack.

Silicon.—A non-metallic element obtainable in either crystal or amorphous form. In the latter form it is a dark brown powder.

Silk Oil.—A compound of extra white neats-foot oil with filtered spindle oil this being mixed to form an emulsion. About 25 per cent of the neats-foot oil is mixed with a spindle oil of 135 viscosity at 100°F. One quart of the oil is emulsified with one gallon of water. The oil emulsion is then mixed with a solution of olive oil soap in hot water. The combined effect of the oil and soap is to remove the natural gummy matter from the silk fibers and thus develop the full luster of the silk without making it harsh.

Simple Engine.—A type of steam engine in which all of the steam expansions are performed in a single cylinder. It may have more than one cylinder, but the steam from each is released after it is utilized for a single stroke.

Single Effect Evaporation.—An evaporator where the complete evaporation takes place in one vessel or with a single heating unit.

Single Stage Compressor.—An air or gas compressor in which the complete compression takes place in one cylinder.

Single Stage Reduction.—The complete chemical reduction taking place in one operation.

Sink.—To drill or put down a drill hole; to submerge.

Sink Hole.—A vertical hole worn by water into limestone rocks along a point or fracture. Such a hole is usually connected with an underground channel.

Sinker Bar.—A bar added to the drill tools simply to give the required weight to effectively operate jars.

Sinuous.—Tortuous, serpentine, full of curves, bends or turns; undulating.

Siphon.—An inverted "U" shaped tube arranged to carry a liquid over the top of a vessel or levee. The leg outside the vessel must extended below the point of level with the surface of the liquid inside. A jet pump is sometimes called a siphon.

Six Size Candle.—A size of paraffin wax candle weighing one-sixth of a pound. It is about ⅞ inch in diameter and 8⅝ inches long. This standard candle is composed of 50 per cent paraffin wax and 50 per cent of stearic acid. The paraffin gives lighting qualities while the stearic acid contributes hardness.

Skelp.—Plates used in making steel pipe.

Skidding The Rig.—Moving a rig from the location of a lost hole preparatory to starting a new one.

Skimming.—The removal by distillation of all the lighter fractions of the oil including kerosene and often a part of the gas oil.

Skimming Plant.—A distillation refinery which is employed to remove only the lighter fractions from the crude petroleum.

Skunks.—A name for a penetrating odor given off by an Ontario crude oil which is very disagreeable and difficult to remove. It is the result of a peculiar combination of a sulphur compound and the hydrocarbons of the oil.

Slab Oil.—The following two neutral oils are said to be suitable:

Gravity	Flash Point	Fire Test	Cold Test	Saybolt Viscosity
32¾° Be.	415° F	480° F	20° F	200
35°	340°	400°	20°	70

Slack Barrel.—A specially made barrel for shipping wax. Usually contains 235 to 245 pounds net of wax. Also a half barrel or tub used by a blacksmith to contain water in which he cools his tongs and from which he dips water to sprinkle his fire.

Slack Wax.—A name for a mixture of paraffin-wax and oil.

Sleeve.—A piece of pipe or thimble for covering a joint or for coupling two lengths of piping.

Slide Oil.—Summer black oil is recommended as a slide oil.

Slips.—Two or more pieces of steel of wedged shape design circular in form with exterior surface roughened tooth like, used on fishing tools, tubing hangers and other devices that are to be attached to either the interior or exterior of casing or tubing, slips up or down on a wedge shaped surface, thus the name.

Slips, Drill Pipe.—The slips which are used to support drill pipe. They fit into the rotary table of a drilling machine.

Slip Grip.—A hold or grip taken by a device upon a pipe or tubing by means of serrated steel slips.

Slip Socket.—Instrument used in oil wells for recovering lost tools from the bottom of a well.

Slop Oil.—Any liquid of petroleum which is not up to quality. "Slop oils" are usually put aside for redistillation.

Sludge Acid.—Sulphuric acid or a tarry substance from the bottom of oil refining tanks that consists of the impurities from the oil mixed with the strong sulphuric acid used as refining acid.

Sluice.—A channel or runway for water or other liquids.

Slush.—To cover and daub with a waterproof material.

Slush Pump.—A pump used to circulate mud-laden fluid through the drill and casing of a rotary drilling well.

Slushing Oil.—An oil or grease used for the protection of metal parts exposed to the weather. There are a number of oils and greases suitable for this purpose.

Slush Pit.—The pit by a drilling well into which the mud and cuttings are discharged. Also called "slush pond".

Smoke Box.—The chamber at the front end of a locomotive boiler over which the stack stands.

Smoke Stack.—A flue or chimney for the escape of smoke and inert gas.

Smoke Stack Saddle.—An oval ring upon which the smoke stack rests.

Smoothers.—A solid lubricant such as graphite, talc or ground soapstone added to the lubricating oil and applied to the bearing will relieve the heating surfaces by filling up the rough spaces and working down the rough edges.

Smudge Oil.—A dark distillate of 26° to 28° Be., gravity, cut from California crude. Used in the citrus belt to prevent damage to trees from frost.

Snap Lever Oiler.—An oil cup with a feeding valve which is opened by a small lever which snaps into place.

Snatch Block.—A single rope sheave set in a housing which provides a latch link to be opened for admission of a rope without it being necessary to thread the end of the rope through the block.

Soap.—Soap is the base of lubricating greases. It forms the thickening and retaining medium for the lubricating oil component. The soap is formed by the process of "saponification", that is, by the addition of fatty acids to metals, metallic salts or alkalis. Caustic soda, caustic potash or slacked lime added to fats such as tallow, horse oil or other fats produce the grease soaps which may be hard or soft, soluble or insoluble in water, depending upon the materials used. The mixing may be completed by cooking or it may be cold.

Soap, Aluminum.—A soda soap is first made, since it is not possible to saponify aluminum and a fat directly, and then a solution of alum and aluminum soap, an insoluble compound, which is then combined with mineral oil to form "oil pulp." After heating and driving off the water the mixture becomes very gelatinous and stringy. It is also known as "Double decomposition grease."

Soap, Calcium or Lime.—In making cup-grease lime or calcium hydroxide is used as the alkaline base, and in combining with the fats forms a soap that is insoluble in water. These soaps are softer when cold than others, due to the fact that they exist in the form of an emulsion.

Soap, Caustic Potash.—Caustic potash (Potassium hydroxide) is used in a limited number of cases to make the so-called "potash soaps" used for certain greases. These soaps are soluble in water.

Soap, Lead.—Litharge or some other slat of metallic lead is combined with the fats to make the soap frequently used in gear and automobile transmission greases. These soaps will resist the continual squeezing and kneading action of the gears better than the lime or soda soaps and do not "track" nor groove out. The leads themselves are quite greasy in the presence of glyceryl hence these soaps are usually oily and therefore well adapted for the ball bearings in the transmissions.

Soap, Linseed Oil.—Linseed oil is used for industrial soap making but is not employed for lubricating soaps to any extent. It is likely to gum and deposit resins where it is much worked or handled.

Soap, Metallic.—Soaps formed by the combination of fatty acids with metals or salts of metals. The soaps are generally stearates of the metals and are greasy with fair lubricating value. While such compounds are employed in making greases notably with aluminum stearate, yet the formation of the soaps is not always desirable. For example when a fatty acid accidentally enters the oil circulating system of a machine, the metallic salts and soaps formed with the metal of the pipes and ducts may produce an emulsion that will clog the system.

Soap, Metal Working.—Soaps and "soluble oils" are used for making cutting and tool cooling compounds for metal working machinery, and in many cases they are better and far cheaper than the lard oil and other oils formerly used. The soluble oils are generally mineral oils held in suspension in water by soaps or alkalis. One soap for this purpose is composed of sodium hydrate saponified by oleic acid. (Resin oil saponified with borax forms the soap for another cutting compound.)

Soap, Olive Oil.—Olive oil soap is much used for treating silk. In combination with SILK OIL it dissolves the natural gummy matter from the silk fibers and increases the sheen of the silk.

Soap, Scouring.—A neutral soap used for scouring sheep wool before working.

Soap, Set Grease.—A cold made soap made by saponifying resin oil with slacked lime. This is insoluble in water and is used only for the cheapest axle grease.

Soap, Soda.—Caustic soda, sodium hydrate is very extensively used as a grease soap alkali. The soda soaps are soluble in water and are generally firecooked to expel the great amount of water contained in the soap at the beginning of manufacture. The water will reduce the melting point if allowed to remain.

Soap, Soft.—In making a soap the fats and alkalis are boiled together until saponification is complete. Either caustic potash, or potash containing a little soda can be used. This gives an amber-colored soap having the consistency of lard.

Soap Stock.—Sweet, light-colored amorphous waxes used in the manufacture of soap and in the saturation of waxed papers.

Socket.—A device fastened to the end of a rope by means of which the rope may be attached to its load; also known as a rope socket. A holder which receives the shank end of a machine tool. A fishing tool designed to encircle and grip a solid object.

Sod Oil.—A by-product of currying leather.

Soda.—A popular name for commercial sodium salts such as caustic soda, sodium hydrate sodium carbonate, sodium bicarbonate, etc. The word "Soda" is a corruption of SODIUM.

Soda Ash.—Crude sodium carbonate. Used in refining petroleum most generally for neutralizing the acids left in distillates after acid treatment.

Sodium Chloride.—Commonly known as table salt, sea salt, rock salt or plain salt. It is a compound of sodium with chlorine and is used in refining and in the manufacture of grease soaps.

Sodium Hydroxide, Hydrate.—Used in petroleum refining and grease making. It is strongly alkaline and saponifying readily with fatty acids to form soap. It absorbs moisture and carbon dioxide gas.

Sodium Hydroxide Treatment.—This salt is used to neutralize the residual acid after the distillate has been given the sulphuric acid treatment and washed in the agitator. It also removes the petroleum acids and phenols, together with certain aciduous sulphur compounds.

Softening Water.—Hard water is softened by the addition of chemicals which precipitate the calcium and magnesium salts contained in the water, or by heating the water and precipitating in the calcium salts. Lime water, sodium phosphate, oxalates, and many other preparations can be used for this purpose, depending upon the nature of the water.

Solar Oil.—A name given to gas oils. Illuminating oil derived from shale.

Solar Oil, Engine.—A distillate oil taken out immediately after the kerosene fractions sometimes called GAS OIL. It is used in oil engines and as a high grade fuel oil. It varies somewhat with market conditions, ranging from a 36° Be. unrefined distillate down to a mixture with gas oil and straw oil. It is not refined nor decolorized. Used in Diesel and Semi-Diesel engines.

Solene.—See gasoline and petroleum ether, with both of which the term is synonymous.

Solid Bitumens.—Bituminous materials showing a concentration at normal temperature of not more than 10.00 under a load of 100 grams applied for 5 seconds.

Solid Bituminous Material.—Bituminous material showing a penetration at normal temperature under a load of 100 grams applied for 5 seconds of not more than 10.

Solid Carbon.—Black carbon in a pure state and free from hydrocarbons, combined hydrogen, or oily or tarry matter.

Solid Lubricants.—Lubracants in a solid form, such as graphite, talc, soapstone, etc.

Solidification.—To convert into a solid form, a liquid or gaseous state.

Solidification Point.—The temperature at which a substance solidifies or congeals.

Solidified Gasoline.—Gasoline converted into a jelly or stearic acid, the acid having previously undergone treatment with hydrochloric acid, at a high temperature in the gasoline. This solution is then mixed with an alcohol solution of sodium hydroxide.

Solidified Kerosene.—Kerosene jellified by treatment with stearic acid. Is sometimes used as a counter-irritant or as a safety illuminant.

Solidified Petroleum.—The following are two of the best known methods which have been resorted to in attempting to solidify petroleum for use in grates. Absorption of the oil by a porous material, preferably itself combustible, as dry peat; and the production of a jelly-like emulsion by the addition of soap or of a fatty oil and alkali to form a soap.

Soluble.—Capable of being dissolved in a fluid. Such solution is generally regarded as purely a mechanical process in which no chemical change takes place in the matter dissolve or the solution.

Soluble Bitumens.—The bituminous matter in asphalt capable of solution in petroleum ether, carbon disulphide, acetone, etc., is distinguished from the solid carbon matters and stable compounds that are not soluble in ordinary solvents.

Soluble Castor Oil.—Castor oil treated with sulphuric acid, also known as "Sulphonated castor oil" or as "Turkey red oil." Used in the textile industries for various purposes but principally as a silk softener and degummer. See: SULPHONATED OIL.

Solute.—The substance that mixes or dissolves in a solvent to produce a solution.

Solution.—The mixing of a solid liquid or gaseous substance (called the solute) with a liquid (called the solvent) and the formation of homogeneous mixture from which the dissolved substance can readily be recovered by crystallization or other physical processes when unaccompanied by chemical change, called physical solution; otherwise chemical solution.

Solvent Naphtha.—Both coal tar naphtha and wood naphtha are marketed under this name.

Soup Wagon.—A wagon or truck used to haul liquid nitro-glycerine.

Sour Dirt.—A dirt impregnated with sulphates resulting from the escape of SO_2 or H_2S. Because sulphur is often associated with petroleum in the salt domes of the Gulf Coast Field, sour dirt, also known as copperas dirt, is considered by many as an indication of oil in that region.

Soya Bean Oil.—A drying oil made from the Soy or Soya bean, which closely resembles linseed oil. Properly refined it is an edible oil, but is more commonly used in the manufacture of paints and varnishes, as a core, sand binder in the foundry and similar purposes where a quick-drying resinous oil is required.

Spacing.—In quarrying the distance between drill holes in a row. In locating wells the distance from center to center of location.

Spark.—A minute flame. The flame produced by an electric current jumping through an air-gap and designed to ignite the combustible gases within an engine cylinder.

Spark Coil.—A coil used for increasing the voltage of a low tension battery current to the very high potential required to break down the resistance of the air gap.

Spark Gap.—The length of the air space, measured between the spark-points, through which the current jumps. In most engines this is about 1/32-inch for gasoline or slightly longer for oil or gas.

Spark Plug.—An ignition device for a gasoline or kerosene engine consisting of a spark gap between two metal wires (electrodes) an insulating body of porcelain or mica for the support and insulation of the wires, and a metal body surrounding the insulator threaded into an opening in the cylinder. One spark point is generally grounded to the metal ring while the other electrode goes to the spark coil or magneto.

Spark Plug, Standards.—The standard thread in the United States is the S. A. E. Standard, having a thread 7/8-inch in diameter with 18 threads per inch. The old spark plug thread used by the Ford car is 1/2-inch standard pipe thread. The metric plug is not much used.

Spear.—A fishing tool used in recovery of ropes and other materials which are lost in a well.

Specific Gravity.—In liquids, the weight of a given quantity compared with distilled water of the same temperature and quantity. In case of a gas a like comparison of the gas with pure air.

Specific Heat.—The ratio of the heat quantity contained by a given substance per pound to the heat contained by the same weight of water. The specific heat of water at its temperature of greatest density equals 1,000. Water has the greatest specific heat of liquids, while hydrogen gas has the highest specific heat of gases. In comparing gases either air or hydrogen may be taken as unity .

Specific Heat, Oil.—The specific heat of petroleum varies with the gravity of the oils and the type of oil, but will probably average about 0.500. That is a given weight of oil will absorb and hold only one-half as many heat units as water at the same temperature.

Specific Viscosity.—The specific viscosity of a fluid is equal to its ABSOLUTE VISCOSITY compared to the absolute viscosity of water at the same temperature. The standard temperature is generally taken at 20° C.

Specifications, A. P. I.—Standard specifications of the American Petroleum Institute.

Specifications Standard.—Many firms have their own standard specifications for the various oils, but when such specifications are lacking it is common practice to adopt the U. S. Government specifications relating to that particular type grade of oil. These specifications are result of the combined efforts of the U. S. Bureau of Mines, the U. S. Bureau of Standards, the American Society for Testing Materials and the American Petroleum Institute (A. P. I.).

Specifications.—A. S. T. M., Specifications of the American Society for Testing Materials.

Speed.—The ANGULAR velocity or number of revolutions per minute or second; the LINEAR VELOCITY in feet per minute or per second, or the speed in miles per hour when vehicular movement is considered. Speed in general is the rate at which distance is covered, or the number of complete turns made in a unit of time.

Speed Governor.—An automatic device used for limiting the speed of trucks, taxicabs and other commercial vehicles. It limits but does not control the lower speeds.

Speed, Peripheral.—Speed in feet per minute or per second at the circumference of a wheel or pulley. Linear speed in a circular path.

Speedometer.—An instrument used for indicating speed of a vehicle in miles per hour or kilometers per hour. It consists of the recording mechanism in the "speedometer head" placed on the dash of the car, the gear system meshing with the road wheels or transmission and the flexible shaft connecting the speedometer head with the gears.

Spent.—Exhausted; deprived of its valuable constituents, chiefly used in shale distillation.

Sperm Oil.—A non-drying oil obtained from the head or blubber of whales. Sperm oil has only a slight tendency toward oxidizing and thickening on contact with air and therefore does not gum readily. It has the lowest settling point (32° F.) of all fixed oils and the lowest viscosity and specific gravity. It is principally of value as a lubricant for delicate mechanisms and as a compound for certain burning oils. Commercially it is frequently compounded with mineral oils to form lubricants.

Sperm Oil, Southern.—Oil obtained from a crystalene mass, "spermaceti," found in the head cavity of the southern cachelot whale. It is separated from the spermaceti and is marketed as a lubricant. A high grade oil.

Spermaceti.—Wax obtained from the head cavity of the cachelot whale. Naturally it exists as a crystalline mass containing a large percentage of sperm oil, but by processing is obtained as an oil free of wax used for making candles, ointments, etc.

Spider.—A solid steel casting designed to hold slips for the purpose of gripping and holding the tubing or casing while connecting another joint to the string. A device to hold a suspended string of casing in a well.

Spiggot Bearing.—A bearing used for aligning the two members of a clutch, the shaft of the driven member being turned down to a small diameter so that it fits into a bearing provided in the shaft end of the driving member.

Spindle.—A small delicate shaft requiring a high grade lubricant, generally revolving at high speed.

Spindle Capacity.—The capacity of a textile mill is generally given in terms of the number of spindles employed.

Spindled Distillate.—A neutral oil which carries the paraffin or wax distillate.

Spindle Oil.—The lighter portion of the lubricating distillates suitable for lubrication of light-running machinery.

Spiral Gears.—Incorrect term for HELICAL GEARS. The teeth of these gears are in the form of a helix or screw thread and not as spiral curve. A helical gear can be considered as a worm or screw consisting of a large number of parallel threads, each thread appearing as a gear tooth at a section cut through the worm.

Splash Feed.—Lubrication of internal working parts by an oil spray splashed from the troughs by dippers or gears. In one type of automobile engine lubrication "splash system" the end of the connecting rods dip into the oil pans and throw the oil up into the camshaft bearings, cylinders and main bearings.

Splice.—To join by interweaving as in the splice of a rope or a wire line. A connection of two parts by overlapping.

Spontaneous Combustion.—A self-ignition of inflammable material caused by the accumulation of heat through slow oxidation.

Spray.—An atomized liquid or a liquid broken up into fine particles forming a mist or fog. This is the first step toward vaporization in a carburetor or fuel burner as the heat converts a spray into vapor more quickly than a mass of fluid.

Spray Lubrication.—Lubrication by means of an oil mist produced by rapid splashing or means of a special pump and nozzle.

Spray Nozzle.—A jet or pipe-end especially designed to break up a liquid into a spray for vaporization or direct burning. Contained in fuel oil burners and carburetors. A nozzle used to aerate and cool liquids as in a spray pond.

Spray Plate.—A hot plate designed to vaporize oil spray, and in an oil engine.

Spray Pump.—A pump supplying oil to a spray nozzle. A hand pump used to spray flowers or plants.

Spring.—A point where water or oil emerges from the ground in sufficient quantity to flow away; as contrasted with seep, from which there is no stream flowing away.

Sprocket Chain.—A chain used for the purpose of transmitting power.

Sprocket Wheel.—A wheel with teeth or pins over which a chain belt runs. Used to receive or deliver power.

Spud.—An appliance used in oil well drilling for clearing a space around drilling tools which have stuck fast. A gouge-shaped tool sometimes as much as 60 feet long. To alternately drop and lift spudding tools when starting a well by cable method.

Spudding.—The initial step in drilling, performed with a spudding bit actuated by a jerk line from the wrist pin of the crank.

Spudding Bit.—A broad, dull drilling tool for working in earth down to the rock.

Spudding In.—The first operation of drilling a well generally performed by cable method. The lift and drop of tools is accomplished by use of a jerk line which is attached at one end of the main crank and at the other to the drilling cable as the latter is paid off from the bull wheel.

Spudding Ring.—A metal ring to fit the crank pin to act as a bearing for the jerk line when spudding.

Spudding Shoe.—A device used for attaching the jerk line to the drilling cable for the purpose of the spudding operation.

Spur Gear.—A gear wheel with straight teeth on the outer periphery and designed to engage with a gear on a parallel shaft. The teeth are parallel with the shaft. In case of two gears of different sizes the larger gear is the "spur" and the smaller is the pinion.

Spur Gear Lubrication.—A heavy oil or grease is generally used for the lubrication of spur gears to take up the impact and shock between the engaging teeth. This offers little difficulty except that the lubricant must not be so solid as to "track" or be cut through by the teeth.

Squib.—In well drilling a vessel containing the explosive and fitted with a time fuse, that is lowered into a well to detonate the nitroglycerine charge. A small charge of nitroglycerine exploded in a well to spring the rock.

Squegee or Squeegee.—A tool with a rubber or leather edge for scraping or cleaning hard surfaces, or for spreading and distributing liquid material over into the superficial interstices of roadways.

Stabilize.—The process of separating light gasses from petroleum or gasolene and thus the liquid is left stable.

Stabilizer.—A tower and still so arranged that light vapors and gas separated from the heavier fractions of same leave the latter in a more stable condition and when condensed the heavier fractions produce a stabilized liquid. Used in gasoline manufacture.

Stack.—A vertical duct for carrying off smoke and objectionable gases or for creating a draft pressure over a fire. The discharge capacity of a stack depends upon the relative inside and outside temperatures, the height of the stack and the cross-sectional area.

Stack Area.—The cross-sectional area of the opening of a stack, generally given in square feet. This determines the size of the gas column.

Stack Draft.—The pressure created at the base of the stack by the difference in weight between the inside heated gas and the outside cold air. Given in terms of water column height supported, or in "inches of water."

Stack Gases.—The burned gases discharged by a smoke stack, consisting largely of carbon dioxide, carbon monoxide, free oxygen and nitrogen with small quantities of free hydrogen and methane.

Stack Height.—Measured above the grates in feet. Determined largely by the draft required and also by the nature of the gases.

Stack, Oil.—As fuel oil requires a smaller percentage of excess air than coal, a smaller diameter stack can be used than with coal. Further, the draft required is also less. Thus, reducing the cost.

Stack Rating.—Given in terms of standard boiler horsepower.

Stadia.—A method to determine distance by sight. A telescope containing two horizontal hairs at a fixed distance apart give a measured reading upon a verticle graduated rod. This reading multiplied by a constant is the distance to be measured.

Stadia Rod.—A graduated rod used with the stadia to measure the distance from the observation point to the place where the rod is positioned. The usual American practice is to use a level rod divided into feet and tenths.

Stadia Tables.—Mathematical tables from which may be found without computation, the horizontal and vertical components of a reading made with a transit and a stadia rod.

Stadia Traversing.—In mapping a method practiced by engineers with a plane table. This method combines traversing and radiation and is readily applicable to the tracing of outcrops. Stations need to be visited only once; distance and elevations are obtained from direct rod readings.

Staggering Wells.—To arrange wells in rows, such that those in one row are placed opposite spaces in the next row.

Stainless Oils.—Oils used for lubricating certain textile machinery which do not stain the fabric and which can be easily washed out. They are used for lubricating spindles on certain machinery and for the shafting. It is usually a light colored or colorless neutral oil compounded with lard oil or neatsfoot oil. Other fixed oils are castor, cottonseed and olive oils.

Stalagmometer.—A tube having a minute orifice in one end for measuring a liquid in drops; a statometer.

Stand.—In oil well language a stand of pipe (either tubing or drill stem) may be two or more joints which form a portion of the string, as the pipe is taken from the well it is disconnected by stands and the stands are set upright in the corner of the derrick.

Stand Pipe.—A vertical cylinder used in small cities to hold a store of water under pressure, and not to be confused with a stand of pipe.

Standard Acid Test.—The acid is determined by the number of milligrams of an alkaline substance, generally sodium hydrate, required to neutralize the acid solution.

Standard Coordinates.—In mathematics, latitude, longitude and height above the mean sea-level are the three coordinates commonly used to define the position of a meteorological station.

Standard Colors.—Oils are commonly graded by color, although the color has little significance except to the refiner. There are a number of standard color comparison systems of which the Lovibond, Saybolt and Union are the most used. In all cases, comparisons of the oils are made with standard colored glasses or standard solutions of potassium bichromate.

Standard Colors, Kerosene.—These colors are all slight variations of white and make very close comparisons necessary. Among the most common trade name colors for these oils are: Standard white, Prime white, Superfine or Water White, the latter being the lightest grade.

Standard Colors of Lubricating Oils, Union.—The Union Calorimeter, manufactured by the Union Petroleum Company and in accordance with the requirements of the National Petroleum Association has the following standard colors for petroleum lubricating oils, each color bearing a significant number or letter.

A Extra light cyl oil, filtered
D Light cyl oil filtered
E Medium cyl oil filtered
G Lily white, N. P. A. No. 1
H Cream white, N. P. A. No. 1½
I Extra pale, N. P. A. No. 2
J Extra lemon pale
K Lemon pale, N. P. A. No. 3
L Extra orange pale
M Orange pale, N. P. A. No. 4
N Pale
O Light red, N. P. A. No. 5
P Dark red, N. P. A. No. 6
Q Claret red.

Standards.—N. P. I .Standards established by the National Petroleum Institute.

Standards.—A. P. I. Standards established by the American Petroleum Institute.

Standards.—A. S. T. M. Standards of the American Society for Testing Material.

Standard Pipe.—The standard adopted by the wrought pipe makers in 1886. Standard is a term frequently but unfortunately used to indicate a regular or common product, but line pipe and oil field tubular goods are now made to conform to the A. P. I. standards.

Standard White.—A kerosene slightly inferior to water white in color and lamp-burning quality.

Standard White Oil.—Kerosene of Standard white color generally referred to export kerosene. (Prime white oil.)

Standing.—A term used by well drillers to denote that work has been stopped for a considerable time.

Standing Valve.—A valve that stands fixed at the lower end of the working barrel of a deep well pump.

Stanekite.—Stanekite is separated from pyroretin by boiling alcohol, which leaves it behind; it is insoluble in potassium hydroxide solution.

Static.—Frictional electricity produced by direct mechanical friction or by atmospheric conditions. Thought to be the cause of many gasoline and tank fires, but it is a question as to whether the static spark can supply enough heat to cause a fire.

Static Chain.—A steel chain suspended from the rear of a tank wagon, and making contact with the pavement, which is to ground a charge of static electricity and thus prevent fire.

Station.—The place for planting the instrument with which an observation is to be made.

Stay Bolt.—A bolt which ties together the walls of a firebox of a steam boiler.

Steam.—Vapor emitted by water at all temperatures, but ordinarily considered as the vapor produced at the boiling point which at sea level is 212° F. or 100° C. The temperature of the steam in a closed vessel is the same as the temperature of the water (pure) from which it is evaporated. The temperature increases as the pressure is increased, but not in direct proportion. Steam may be superheated in which case its temperature is greater than its boiling point, this is done in modern power generation.

Steam, Absolute Pressure.—The pressure of steam measured above perfect vacuum. This is equal to the pressure shown by the steam gauge plus 14.7 pounds per square inch, or the atmospheric pressure.

Steam, Absolute Temperature.—Temperature above absolute zero. Obtained by adding 460° F. to the thermometer temperature or 273° C. with a centigrade thermometer.

Steam Engine.—An engine in which the piston is moved by the pressure of steam. The steam being expanded in the cylinder thus gives up heat which is converted into mechanical power. Most engines are of the double acting type, steam being admitted alternately to one end of the cylinder and then to the other by means of an automatically operated steam valve or valves. The cylinder and the sliding piston are lubricated by very viscous oil .

Steam Cooked Grease.—Grease cooked in steam jacketed kettles.

Steam Distillation.—Steam introduced into a still during petroleum distillation for two purposes; first, to lower the boiling point of the oils being distilled by adding the vapor pressure of steam, and second to minimize cracking.

Steam Gravity.—The gravity of a steam of distillate taken at the receiving house just as the distillate comes from the condenser.

Steam, Quality.—Quality of steam in steam power plant tests is determined with respect to moisture content.

Steam, Saturated.—Steam holding just sufficient water for saturated balance at the given pressure without free moisture and with a temperature not exceeding the temperature at which it was generated.

Steam, Superheated.—Steam heated above the temperature at which it was generated by contact with hot surfaces or by passing through a device known as a "Superheater."

Steam Temperature.—The temperature of saturated steam is related to the pressure but does not directly vary with the pressure. The higher the pressure of saturated steam, the higher the temperature. "Superheat" is the amount by which the steam is raised above the temperature of the saturated steam at the given pressure. By superheating the temperature can be increased from 50° F. to 150° F. with corresponding increases in the engine economy.

Steam Turbine Lubricating Systems.—Most steam turbines are provided with closed circulating systems in which the oil is supplied to all bearings under pressure by a pump. Slight feeds at the bearings and regulating valves permit of the proper adjustment of flow. An excess heat is removed by the oil and is carried to water coolers in the base of the machine. In the very large turbines, cooling water is applied directly to the bearings by coils or water-jacketed bearing shells. Some of the pressure oil is carried to the speed control governor so that the oil pressure operates the heavy main steam valve under the control of a relatively light sensitive governor.

Steam Turbines.—The steam turbine is a purely rotary type engine in which the moving (Rotor) consists of a series of bladed wheels mounted on the same shaft. A number of steam nozzles placed around the periphery of the bladed wheels blows steam against them and turns them around at high PERIPHERAL SPEED. In flowing through the nozzles, the steam is expanded and its velocity is greatly increased so that excellent steam economy is had. The speed of the rotor is very high from 15,000 revolutions per minute to above 40,000 revolutions per minute in the small sizes.

Stearate.—A metal salt formed by the union of the metal and STEARATE ACID.

Stearic Acid.—One of the free fatty acids occurring naturally in animal and vegetable fats such as tallow, suet, palm oil, castor and rape oils. It has a corrosive effect on many metals forming the greasy salts known as the "Stearates," which are used as soaps in the manufacture of greases. Stearic acid is obtained by breaking down STEARIN and then neutralizing the acids freed by the decomposition. Used in compounding lubricating oils.

Stearin.—This is a white odorless tasteless powder obtained from animal fats which is used in soap and candle making and in compounding lubricating oils. It is technically known as Tristearine and Glyceryl-Stearic Ester. Chemically it is an "ester" produced by the combination of the stearic acid and glyceryl radicals.

Steatite.—An earthly material used in the manufacture of spark plug porcelains. Same as talc.

Steel.—Steel is nearly pure iron and contains carbon only in solution or combined form up to approximately 1.20 per cent. The combined carbon forms groups of carbides with the iron which are known as cementite, pearlite, etc., and which give the steel and properties of hardening and tempering under heat treatment. Steel is made by removing the free suspended carbon from cast iron by a process of oxidization. It can be cast, welded, hot or cold rolled, drawn into wire and is capable of machining commercial grades in the form of annealed (soft) steel, half-hard (medium steel), or hard, depending upon the carbon content.

Steel, Acid Process.—Steel produced by the "Acid openhearth" furnace in which silica sand is used as a flux and bed, and in which the phosphorous is displaced by an acid reaction. Requires high grade scrap and materials but is the cheaper process and the steel is relatively high in phosphorous.

Steel, Air Hardening.—Steel hardened by heating and allowing to stand in the open air to cool or chilled by an air blast to gain greater hardness.

Steel, Alloy.—The characteristics of carbon steel can be modified by alloying or mixing them with small percentages of other metals. Thus the metal tungsten is alloyed to produce cutting steels for metal working, vanadium is alloyed to increase the resistance to fatigue, nickel for toughening, etc.

Steel, Annealed.—Steel softened by prolonged and gradual cooling.

Steel Barrels.—Packages used for oil shipment. They have a much longer life than the old wood barrel, cost less for maintenance, do not contain glue or other substance which will contaminate lubricat-

ing oils, are not subject to leakage, and have many other oxidization or to impart hardness.

Steel, Basic.—Steel produced in BESSEMER or OPEN-HEARTH furnaces by the use of alkaline materials and linings to neutralize the phosphorous and sulphuric acids. Materials used are dolomite for the flux (Limestone) and magnesite faced brick for the furnace lining. This is the purest steel from the standpoint of phosphorous content and permits the use of cheap scrap and high phosphorous iron in charging.

Steel Baths, Oil.—Vessels containing oil, sometimes water-cooled, used for hardening heated steel by chilling or quenching.

Steel, Bessemer.—Steel produced in the Bessemer Converter where the iron is decarbonized by blowing jets of air through the molten metal, the air oxidizing the carbon and many of the impurities. Used principally for rails and other rough steel.

Steel, Carbon.—Simple steel produced by the decarbonizing of cast iron which contains only carbon as a hardening agent. Increasing the carbon content increases the possible hardness to be attained by quenching, the hardest steels being obtained with a carbon content of about 1.20 per cent, while the softest steels contain only from 0.08 to 0.10 per cent carbon. It is difficult to harden steel with less than 0.36 per cent carbon, hence, all cutting tool steels are above this mark. Medium steels used for structural steel, 0.16 to 0.25 per cent carbon, averaging 0.16 per cent. Carbon alone increases the brittleness as well as the hardness.

Steel, Case Hardened.—Soft or medium steel hardened only on the surface by increasing the carbon content of the skin. This is done by heating the steel in contact with carbonaceous materials, the skin absorbing carbon from the materials.

Steel, Cast.—Steel shaped into form by pouring the molten metal steel moulds.

Steel, Carbonized.—See: STEEL CASEHARDENED.

Steel, Cemented.—Steel in which the carbon content is increased throughout the mass by heating it in contact with carbonaceous materials.

Steel, Cold Drawn.—Steel produced by drawing the bars successively through a number of dies to form cold drawn shafting, bars, tubes, etc., which are very close to dimensions and which have a more compact structure than obtained by hot working.

Steel Cutting Compounds.—Oils, emulsified soap compounds and soluble oils are used for lubricating and cooling the cutting tools used with metal working machinery and similar devices.

Steel, Dead Soft.—A very soft low carbon steel used for cold working under forming dies, producing sheet metal shells, etc., by the use of deep drawing forming dies or sharp angled bends.

Steel, Die.—Steel which will not crack nor blister when heat treated in thick blocks and adopted specially for hardening die work. Such steel must not warp or shrink.

Steel, Electric Furnace.—High grade tool steels and alloy steels made in an electrically heated furnace in which there is no opportunity for picking up impurities from the fuel.

Steel Hardening, Quenching.—By heating steel to a critical temperature and then plunging it into a bath of oil of water, the steel changes from a plastic to a solid so quickly that the carbides have no opportunity to readjust themselves and the steel is hardened. The quicker the cooling, the harder the steel becomes. Quick chilling of high carbon steels results in a glass-hard product, while intermediate carbons and slower quenching give intermediate hardnesses.

Steel Hardening Oils.—A hardening or quenching oil can be a petroleum product, an animal oil, vegetable oil or a compound of all. Fish oils are used extensively for quenching steel springs. As the specific heat of oil and its heat conductivity are much lower than that of water the oil does not chill so rapidly and there is less chance of extreme hardness or brittleness, and hence less chance of developing cracks and flaws through excessively quick contraction.

Steel, Heat Treated.—Steel that is brought to the desired condition of hardness and toughness by repeated heatings and coolings.

Steel, High Speed.—An alloy tool steel, generally containing tungsten, which is capable of high cutting speeds and deep cuts when used with metal working machinery. Such steels can be worked until they are red hot from friction without losing their hardness or cutting edge.

Steel, Low Carbon.—Soft steel, not capable of hardening by quenching.

Steel, Mangenese.—A very hard alloy steel containing manganese as an alloying material. It is used for track curves where wear is excessive, with soft steels, for burglar-proof safes, armor, car wheel tires, crusher jaws, etc.

Steel, Medium.—Structural steel, tank plate steel, steel for beams and rails, etc., containing from 0.16 to 0.25 per cent of carbon. This is rolled material.

Steel, Nickel.—An alloy steel using nickel as a toughening agent, permitting great hardness to be obtained by the use of a high carbon content without causing the steel to be brittle.

Steel, Open-Hearth.—Steel produced in an open-hearth furnace, or a furnace in which the molten steel is purified by flame sweeping across its surface while it lies in a puddle on the "hearth." The puddle is formed by a scooped-out sandbed and by the addition of fluxing materials the impurities are oxidized or neutralized while heating. The open-hearth furnaces may be the "Acid" type with a silica sandbed and silica brick lining, or the "Basic" type with a dolomite bed and magnesite brick lining, the latter having an alkaline reaction which neutralizes the phosphoric acid.

Steel, Steel Furnaces.—The steel furnaces used for melting and treating steel can be heated by coke, producer gas and fuel oil. This includes the Open-hearth Furnaces, Soaking Pit Furnaces, Blast Furnaces, Reheating Furnaces, Heat Treating Furnaces and similar types. The Bessemer furnace is self-heating, the carbon in the iron acting as the fuel while being oxidized by the air blast.

Steel, Sucker-rod.—Sucker-rods are made of a special carbon steel carefully forged and sometimes given a normalizing treatment by heating and allowing to cool slowly. The elements other than iron are about as follows: Carbon .35 to .55 per cent, manganese .65 to .95 per cent, sulphur less than .04 per cent, silicia only a small amount.

Steel, Spring.—High carbon steel of great hardening and elasticity.

Steel, Structural.—Medium carbon steel, used for building and bridge beams.

Steering Gear Grease.—A semi-fluid grease preferably containing graphite.

Stellarite.—A variety of asphaltum, called also Stellar coal, because stars of fire drop from it when burning.

Stellite.—An alloy of cobalt, molybdenum and chromium or tungsten; it is used for high speed tools and instruments. Also called stoodite. It contains very little iron 3 to 4 per cent. One analysis of a sample is given as follows:

	Per Cent
Co.	59.50
Cr.	10.77
Mo.	22.50
C.	.87
Si.	.77
Mn.	2.04
S.	.08+
P.	.04
Fe.	3.11
	99.68

Stem.—The heavy iron rod to which the bit is attached in deep drilling by the rope cable method.

Step.—A series of closely associated parallel faults.

Step Bearings.—Bearings designed to take up the end load of vertical shafts. A type of end thrust bearing. In some steam turbines the end load is taken up by oil pressure on the end of the shaft, maintained by an oil pump, but in the most common types the load is supported by foot planes giving increased bearing area of by double foot plates given to planes of shear. Collars placed on the shaft are also used to take up the thrust.

Step Bearing, Kingsbury.—A special form of step bearing in which a shaft is supported on a perfect oil film (floating) maintained by inclined planes on the bottom of the shaft. The inclined planes compress the oil and thus lift the shaft by the reaction.

Step or Interval.—The vertical interval measured on the rod, suspended between two stadia hairs. A hitch or dislocation of the strata.

Stepping.—The method of finding the elevation of a point. This calculation is made by moving the bottom stadia-hair to the upper stadia hair. This process is not accurate and should therefore be used for measuring "side shots" only, and not for control stations.

Sterilization of Cutting Oils.—Oils and compounds used for metal cutting and working should be sterilized to prevent infections in cuts and bruises.

Still.—A device for vaporizing liquids by the application of heat, the vapor afterwards being condensed to a liquid state by means of a condenser. In petroleum refining the still is a sort of boiler for heating crude oils or raw distillates and vaporizing them at different temperatures so that the different hydrocarbons can be separated and collected in the order of their boiling points. The still may consist of a cylindrical boiler-like tank or of oil-filled tubes heated on their out surface by the fire or steam.

Still, Batch.—Any still in which a charge of oil is completely distilled or "run down" before replacing or refining it with fresh stock.

Still, Blowing.—In which the asphalt residuals are oxidized and thickened by blowing.

Still, Cheese Box.—An early type of cylindrical still with the axis vertical and provided with a vapor collecting dome.

Still, Coke.—The residue left in the still on distilling crude shale oil to dryness. In the case of the best crude oil, it represents about 3 to 4 per cent of the oil. It is used as a fuel, as carbon for electrical purposes, and for making moulders' blacking.

Still Coking.—See: Tar Still.

Still, Continuous.—A still in which distillation proceeds continuously compared to the intermittent action of the BATCH STILL. A number of such stills are connected together with each of the stills vaporizing a certain band of fractions. The oil is pumped from one still to the next without intermission. The first still takes off the lightest fractions, the next still receives the oil from the first and distills off the next heavier series, and so on, through the apparatus until the oil is finely reduced to the residual.

Still, Cracking.—A high pressure high temperature still for cracking oils; see cracking distillation.

Still, Fire.—A still heated by the "fire" of coal, residuals or gas.

Still Gas.—Fixed gases are produced during the distillation process, and particularly during cracking distillation. They are the result of decomposition of the petroleum hydrocarbons.

Still Grease.—The amorphous distillate from the end of the crude oil and heavy distillation in the shale-oil industry. It is used for grease-making.

Still, Lubricating Oil.—A still which distills the lubricating hydrocarbons after a previous distillation has removed the gasoline, burning oils and wax distillates.

Still Pre-heater.—A closed tank and pipe coil arrangement by which the incoming crude or raw oil is heated by the condenser water to save fuel ordinarily necessary to raise the crude to still temperature. A Heat Exchanger.

Still, Reducing.—A still in which the temperatures are reduced by a steam supply to prevent "cracking" or decomposition.

Still Setting.—The brickwork support and insulation applied to a still.

Still Steam.—A still in which the heat is supplied by steam in reducing gasolines and kerosenes, generally redistillation from a raw distillate obtained from the crude.

Still, Steam Bottom.—A still in which "bottom steam" is admitted to the oil to reduce the temperature and to prevent decomposition.

Still, Tar.—Large stills in which the heavier portions of crude petroleum are distilled by intense firing, including the heavy lubricants, tars, etc. This is continued until nothing is left in the still but solid coke.

Still, Tower.—Crude oil stills which prevent accumulations of coke and which also prevent excessive cracking.

Still, Vacuum.—A still working under a partial vacuum as in the distillation of heavy lubricating oils. Distillation under vacuum permits of distillation at lower temperature, and hence does not decompose the lubricating distillate. The vacuum is maintained by a pump.

Still Wax.—The waxy product, usually yellow, indicating the end of a petroleum distillation.

Stirrup.—A loop over the end of the walking beam and attached to the pitman. A hanger.

Stitching Oil.—A lubricant employed for stitching shoes; it is usually supplied in three grades, "water white" for stitching white or light colored shoes; "fine white" and light straw colored.

Stilson Wrench.— A pipe wrench.

Stock.—An oil to be finished into some specified product; as cylinder stock.

Stock Oil.—Used for oiling rags and cotton waste to prevent dust and lint and to create weight, generally a pale yellow oil having a flash point of about 300° F., a viscosity of 50″ to 60″ and cold test of 30° F.

Stocks.—Petroleum in storage, awaiting transfer of ownership or utilization.

Stoichiometry.—This science treats of the proportions of matter, calculations involving atomatic weights, and molecular weights relations.

Stoker's Oil.—A special SIGNAL OIL used by the stokers and coal trimmers. An illuminant for the fireroom and coal bunkers; used in marine service.

Stoodite.—See: STELLITE.

Stopcocking.—A production method for controlling gas pressures in oil wells by keeping the well closed in and the gas confined except during stated intervals when the oil is flowed or pumped.

Stop Valve.—A valve on the top of a steam boiler used to close the main steam outlet.

Storage.—Facilities for storing oil. Earthen, wooden, cement or steel.

Storage Losses.—Loss of crude oil (light ends) and petroleum distillates by evaporation, leakage, expansion and contraction, etc., from storage tanks.

Storage Tanks, Oil.—Formerly of wood, later of steel with wood covers, and later still of steel construction with vapor tight steel roofs. Concrete tanks for the storage of fuel oils are satisfactory, but not the distillates or crudes containing volatile hydrocarbons.

Storm Oil.—Oil used in SEA-DRAGS and spread over the water

to prevent waves from breaking. Almost any oil lighter than water will do for this purpose if of low cold test.

Stove Distillate.—A stove gasoline before receiving a finishing treatment.

Stove Oil.—A light fuel oil, gas oil, or straw oil or kerosene used in wickless burners for kitchen stoves and domestic heating apparatus.

Stove Pipe Casing.—Light riveted pipe of large diameter, used in starting a well.

Straight Run Distillation.—A continuous distillation of the products of petroleum in the order of their boiling points without cracking or compounding with other products. This involves the successive distillation of the hydrocarbons in order of their volatility from the lightest to the heaviest. Also called STRAIGHT-RUN FRACTIONAL DISTILLATION.

Straight Run Pitch.—A pitch run in the initial process of distillation to the consistency desired with subsequent fluxing.

Straight Run Gasoline.—A gasoline distilled at atmospheric pressure without cracking or compounding with other products by STRAIGHT RUN DISTILLATION. This is the original method of distilling the natural gasoline fractions contained in the crude oil, all of the fractions being closely related and having closely related boiling points. The elementary compounds run in a continuous chain from the most volatile to the heaviest in the range of fractions.

Strain.—To filter through a cloth or wire mesh for the removal of solid or semi-solid matter. Mechanical purification without changes in the properties of the liquid. Effect due to excessive pressure or tension.

St. Quirinus Oil.—Petroleum was used medicinally in Germany as early as 1436 under the name "St. Quirimus Oil," the supply coming from the Tegernsee district of Bavaria.

Strapping.—As done to determine the capacity of a tank per unit depth. Calculating the content in barrels or gallons per each inch depth of a tank.

Stratified Rock.—Rocks deposited in distinct generally parallel beds. The distinction between the beds is due to differences in the material, or the size of material deposited. An individual bed is a stratum and the dividing plane is called a bedding plane.

Stratigraph.—A sectionel view taken through the earth at a given point showing the nature of the geological strata.

Stratigraphic Correlation.—The determination of the equivalency or nonequivalency in age of separated rock outcrops, accomplished by means of fossils, lithologic similarity, etc.

Stratigraphy.—That branch of geology which treats of the formation, composition, sequence, and correlation of the stratified rocks as parts of the earth's crust.

Straw Oil.—A light oil used as an absorbent for natural gasoline for rubbing and polishing, and as a high grade fuel oil. It belongs to the Gas Oil division of distillates and has a very low olefine content. Gravity about 32° Be., cold test 38° F. It contains about 2.5 per cent of paraffine wax.

Strength, Ultimate.—The breaking strength of a material.

Stress, Electrical.—The electric potential or pressure tending to break down a dielectric material or insulator.

Strike.—The course, or bearing, of the outcrop of an inclined bed or structure on a level surface; the direction, or bearing, of a horizontal line in the plane of an inclined stratum, joint, fault, cleavage plane, or other structural plane; it is perpendicular to the direction of the dip. To find oil in drilling of a well.

String.—A series of well-drilling tools arranged for lowering into the hole. They are the drilling bit, auger stem, jars, sinker-bar and rope socket. A string of casing likewise.

Stringer.—A timber in a horizontal position as a supporting member in a structure.

Stringing.—Distributing pipe for a pipe line along the right-of-way.

Stripping.—The removal by distillation of all light fractions down to those of lubricating value. In mining the removal of overburden.

Stripping Silk.—The process of removing the natural gum from silk by the use of SILK OIL and olive oil soap. This gives luster to the silk.

Strut.—A compression member or column.

Structure.—That part of the geology of a region which pertains to the altitude of the rocks, the nature and amount of any, of the deformation they have undergone, and the distribution and mutual relations of the structural features.

Stud.—A short rod threaded on both ends, one end is usually screwed into a solid body of a machine while the other has a nut to hold some part in place.

Stuffing Box.—A part of a pumping well connection through which the polish rod passes. The chamber designed to contain packing and to maintain a fluid tight joint about a piston rod where it enters a cylinder.

Submergence.—That distance in a vertical direction to which a gas lift line is submerged. A term used in gas lift pumping to describe the ratio or per cent of the length of the gas injection line that extends below the surface of the liquid.

Sublimates.—Solid condensates obtained by the distillation of certain substances. The sublimate is a crystal or powder obtained by distillation.

Sublime.—To distill and condense certain substances that cool into crystal or powder instead of condensing to liquids.

Subterranean Storage.—Accumulation of oil and gas in porous rocks underground; the bringing of gas during the summer months from distant points and storing it in some anticline near the point of winter consumption.

Sucker Rod.—A rod of either steel or wood with screw connection at the ends providing a means for connecting with other rods forming a series or "string" of rods used to extend down in a well to the working parts of the pump, and to actuate same.

Sucker Rod Hanger.—Sucker Rod Jack.—A device used in the upper part of a derrick from which to suspend sucker rods when they are pulled from the well to permit of repairs to the well or to some of the equipment of the well.

Sucker Rod Joint.—An especially designed screw joint, recently made standard by the American Petroleum Institute, to connect sucker rods together.

Suction.—A condition created in a closed vessel by a partial vacuum to the removal of air or gas. Suction is spoken of in connection with the operation of pumps, ejectors, syphons, and other apparatus used to suck in a fluid and to deliver same at a pressure or head greater than before.

Suction Line, Pump.—The intake line of a pump or the inlet piping leading to the pump.

Suction Pump.—A pump that lifts water or liquids by suction. More exactly the atmospheric pressure forces the liquid into the vacuum space created by the pump.

Suds.—A mass of air bubbles retained by the film of a viscous fluid such as oil or a soap and water solution. Froth.

Suet Oil.—Properly "oleo-oil," obtained from beef fat.

Sulphide, Hydrogen.—A gaseous compound of sulphur and hydrogen having the odor of rotten eggs. Occurs frequently in crude petroleum and at the wells.

Sulpho Compounds.—Compounds formed by the sulphuric acid treatment of petroleum lubricating oils which form curdled masses when brought into contact with water and are often the source of emulsions with the lubricating oils. They are a sulphur compound generally containing some sodium from the neutralizing treatment, and should be reduced to a minimum when used in the presence of moisture.

Sulphonic Acid.—An acid formed by the oxidization of certain sulphur compounds found in crude petroleum. (Also, SULFONIC.)

Sulphonated Oils.—A fatty oil that has been treated with sulphuric acid, the excess acid being washed away and the oil neutralized with soda or ammonia. Sulphonated castor oil is probably the best known of these oils, although rape oil has long been used in the form of a sulphonate. They are soluble in water and give the water a slight opalescence. Used for cutting oils, textile mill operations, and for plant sprays. See: SOLUBLE OILS .

Sulphonated Wool Oil.—Any sulphonated oil used as a wool lubricant or softener.

Sulphur.—S. A non-metallic element of lemon yellow color sometimes known a "BRIMSTONE". It burns with a blue flame emitting clouds of sulphur dioxide, a suffocating gas used in the manufacture of sulphuric acid. Sulphur is contained naturally in crude petroleum coal and metallic ores, and in most all cases it is an undersirable element. With oil and coal it causes corrosion and bad odors, and in the case of metals it has a weakening effect. Sulphur combines directly with many metals to form sulphides.

Sulphur, Allotropic.—By melting and heating sulphur to a high temperature, a brown gelatinous mass is formed which is still sulphur but in another form. Left to stand, it gradually returns to its former state.

Sulphur Dioxide.—A gas formed by burning or oxidizing sulphur that is often noticeable at oil wells. It is also used as a refrigerating medium in ice machines and also in some petroleum refining processes.

Sulphuric Base Oil.—See: Sulphonated Oils.

Sulphurated Hydrogen.—A colorless gas H_2S somewhat soluble in water, having a smell of rotten eggs.

Sulphuric Acid.—A highly active acid formed by a compound of sulphur, oxygen and hydrogen. It is a heavy oily liquid. Specific gravity 1.8342, which absorbs moisture eagerly in the refining of petroleum distillates, the acid being mixed with the distillates to carry down the tars and other matter in the form of sludge. It is also called "Oil of Vitrol".

Sulphuric Dioxide.—A colorless gas SO_2 having the well known odor of burning sulphur.

Sulphurous Acid.—A sulphur acid having one less oxygen atom than Sulphuric Acid. It has a strong sulphur odor. Forms the SULPHATE salts and is used by refineries in various treating processes.

Summer Oil.—A heavy railway car and engine oil that has a flash point of above 140° C and solidifies below minus 5° C.

Summer-Black Oil.—A black lubricating oil of 540°F., fire test, used as a heavy tempering oil and for water-proofing cement.

Sump.—A hole provided in the cellar forming a small chamber from which to remove water or liquids that may leak into the cellar. A basin to receive refuse or drainage.

Superheat Engines.—Engines designed specially for use with superheated steam, usually employing poppet valves in place of slide valves and using straight mineral oils instead of the compounded mineral oils used with saturated steam. The fixed oils of compounded cylinder lubricants decompose under the high temperatures of superheated steam and as there is no moisture in these cylinders the fatty oils are not needed.

Superheater.—A pipe coil or manifold device used for superheating steam by means of the furnace gases or by a separate fire. It serves to increase the heat of steam above that of saturated steam.

Surface.—The top of the ground; the soil, clay, etc., on the top of strata. The area at which one material may come in contact with others. In a liquid the top plain is considered the surface.

Surface Carbureter.—A type of carbureter little used at the present time which consists of wicks dipping into a reservoir of gasoline. This enormously increases the evaporating surface presented to the intake air and the required amount of gasoline is then evaporated from the surface of the wicks. The drawback to this system lies in the fact that the wicks become clogged with paraffin.

Surface Geology.—The geology of the superficial deposits and of the surface, of the fundamental rocks.

Surface Tension.—A tension existing in the surface strata of a liquid caused by unbalanced forces set up by the cohesion of the molecules. This results in a taut skin of surface molecules which has considerable strength. The surface tension plays an important part in lubrication for it determines largely the tendency for the oil to remain in the bearings under pressure, and also the penetrating quality of the oil.

Surface Treatment.—Treating the finished surface of a roadway with bituminous material.

Surfacing.—The crust or pavement, treating the surface of a roadway.

Survey.—To determine and delineate the form, extent, position, etc., on a tract of land, coast, harbor or the like, by taking linear and angular measurements and by applying the privileges of geometry and trigonometry.

Surveying.—Act of occupation of making surveys. That branch of applied mathematics which teaches one art of determining the area of any portion of the earth's surface, the lengths and directions of bounding lines, the contour of the surface, etc, and accurately delineating the whole on paper.

Swab.—A rod provided with a plunger, used to clean the dirt out of line pipe. A plunger with rubber flexible packing used in a well casing to produce oil by the method of swabbing.

Sweat.—To remove oil from paraffin wax by a process of heating in shallow pans. The oil being lighter in weight than the wax, separates when heated and floats off. This is done after the excess oil has been removed by the presses.

Sweated Scale Wax.—The crude gray or nearly white oil moisture free wax coming from the sweaters before finel filteration for semi-refined grades.

Swedge.—A tool used in oil wells for straightening buckled casing. A tool used by blacksmith. To reduce in diameter by use of blacksmith's swedges.

Swedged Nipple.—A nipple that has one end drawn down smaller than the other; a reducing nipple.

Sweeping Oil, Floor.—A compound of some such material as sand or sawdust with an oil used to prevent dust when sweeping floors and to remove dirt and grease. The sawdust and sand mixture is dampened with rosin oil, a light non-viscous paraffin oil or pine oil, or a compound of these oils. A little coloring matter (Aniline Myrtle green) or a little odor can be added to the mixture as a trade mark for commercial compounds.

Sweet Crude.—Crude oil containing little or no sulphur.

Sweetening Still.—A still in which distillates or other petroleum products are improved in odor.

Swing.—A pivoted device with arms which radiate in a horziontal plain, used to change the direction of a rod line to a well.

Swivel.—In oil well drilling, a short piece of casing having one end belled over a heavy ring, and having a large hole through both walls, the other end being threaded. Some use this word in place of swivel neck.

Swivel Neck.—A forged steel connection used between rotary drilling hose and the top of the grief stem. Its design permits the drill pipe to be rotated in the hole while the water is pumped into it to create circulation needed to remove cuttings as made.

Swivel Wrench.—A special heavy wrench made to fit the square of a drill bit, provide with swivel device for suspension by a hoisting line so that the bit may be easily handled.

Synclinal.—In geology, characteristics of, or situated in, or forming a syncline. The opposite of anticline.

Synclinal Axis.—The central line of a syncline, toward which the beds dip from both sides.

Syncline.—A fold in rocks in which the strata dip inward from both sides toward the axis. A concave surface. The opposite of an anticline.

Synclines.—The low point or "Valley" in a petroleum geologic structure of rolling form or wave-like structure.

Synthesis.—The act or process of making or building up a compound by the union of simpler compounds or of its elements.

Synthetic.—Compounded, put together, or made artificially.

T

Tachometer.—An instrument of the direct reading type indicating the speed of a shaft or machine in revolutions per minute.

Tag.—Abbreviation for TAGLIABUE.

Tagliabue Hydrometer Scale.—A density or gravity hydrometer formerly much used in the United States. Gives Baume readings but differs from the Standard Baume scale adopted by the United States Bureau of Standards. With heavy oils the difference between the Tagliabue and the U. S. Standard is practically nil, but with light oils it may amount to as much as 0.5° Be., and the same holds for gasoline measurement.

Tagliabue Viscosimeter.—An American viscosimeter now little used and is superseded by the Saybolt Universal instrument in most American laboratories. Its readings are considerably different from the Saybolt Universal, but the Saybolt Universal readings can be converted into "Tag" by multiplying S. U. by 0.28 at 100°F., by 0.51 at 212°F.

Tail House.—The house into which the distillate runs for test and distribution to the storage tanks. Also called the "Cut House" or Junction house.

Tail Rods.—The false piston rods projecting through the cylinder head of a large engine for the support of the heavy piston.

Tail Shoes.—The cross head or slider carrying the outer end of the TAIL ROD.

Tailings.—The inferior leavings or residue of any product; foots, bottoms; also a shortened term for wax tailings or gum, the last distillate passing off before coking of dry run crude or tar.

Talc.—A very soft, greasy, hydrous natural stone (Magnesium Sillicate) very similar to soapstone. Used as a filler for certain lubricating oils and greases or as an abrasive in hot cut bearings.

Tandem Compound Engines.—Steam engines with the high and low pressure cylinders in a fore and aft line with both pistons mounted on the same piston rod.

Tandem Gas Engines.—Engines with two cylinders in line and using a common piston rod.

Tank.—A large vessel or receptacle, made either of wood or of metal, intended to contain a fluid as oil or water; as water tank, gasoline tank.

Tank, Agitator.—A tall vertical steel tank generally with a domed steel roof, used for the acid treatment and purification of petroleum distillates. A charge of distillate and dilute acid is stirred together in intimate contact (Agitated) by jets of compressed air or similar means.

Tank, Air.—A cylindrical tank used for storing air under pressure, commonly used by service stations for the storage of air for tire inflation. A tank used to contain air under high pressure for use in starting internal combustion engines.

Tank Balloons.—Large fabric balloons connected to storage tanks to receive and conserve the light gasoline vapors driven off when the tank is heated by the sun. The vapors are returned to the tank when it cools off at night or during cloudy weather.

Tank Barge.—A barge or scow divided into compartments for carrying bulk crude oil or fuel oil. A true barge is towed by another vessel, but in some cases they are provided with auxiliary power.

Tank, Bleaching.—Open top tank used for bleaching oils by exposing them to the sun's rays. The oil is floated in a thin layer on top of water.

Tank, Bolted.—Portable tank in which all the plates are bolted together instead of riveted. Generally used as emergency storage for crude oil in the field.

Tank Breather Tubes.—Outlet pipes for allowing the escape of air and vapor while the tank is being filled or when the vapors are expanding during a heated period. This is wasteful, as a whole tank full of vapor is expelled at every filling and water vapor is drawn in when the tank is emptied.

Tank Car.—A horizontal cylindrical tank mounted on a sub-frame and carried by freight car trucks. Used for the transport of bulk distillates and fuel oils. They may or may not be equipped with compartments, but are often provided with steam heating coils for thinning out the oil in cold weather so that it can be discharged, and are generally supplied with a dome on the top of the car.

Tank Coils.—Steam coils for heating heavy oils.

Tank, Concrete.—Storage tank made of reinforced concrete for the storage of fuel oils or crude oil.

Tank, Crude Oil Storage.—Large steel tank with or without vapor-proof roof, used for the storage of crude oil in the field, pipe line stations, tank farm or at the refinery. Capacity in barrels of 42 gallons. A 55,000 barrel tank is probably the most used for this purpose. There are larger tanks in some cases made of both steel and of concrete. The concrete tanks are of a reservoir type and provided with closed tops.

Tank Cylindrical.—A tank of cylindrical form with round heads and having the length greater than the diameter. They may be of the horizontal of vertical type, overhead or underground.

Tank Dome.—A short cylindrical bonnet placed on the top of many horizontal tanks and tank cars for the inspection of the contents, to provide space for expansion and to provide a filling connection.

Tank, Earthern Storage.—An emergency storage tank for crude oil at a new well to take care of the production until steel tanks can be erected. Earthern storage is had by building up banks of earth or dikes to provide a pool.

Tank Farm.—Land on which a number of storage tanks are located, generally crude oil storage tanks for the producer, refiner or pipe line.

Tank, Flow.—The tank into which the crude oil flows from the well and is allowed to settle. Silt, water and emulsions are separated from the oil at this point before delivering to the pipe lines for transport to the refineries.

Tank, Fuel Oil.—Tank for the storage of fuel oils. Tank carrying heavy residual fuels are provided with steam pipe coils for liquefying the oil in cold weather and vent pipes for the escape of light fractions and gases.

Tank, Gasoline.—Specially tight tank for the storage of gasoline and similar light hydrocarbons, preferably with welded seams. May be of the underground or level type, but buried tanks show the least loss by evaporation because of the more constant temperature maintained on the gasoline.

Tank, Gasometer.—Tank of the variable capacity type with sliding counterweighted upper sections for maintaining uniform pressure on the enclosed gas. This tank is employed for the storage of gases and vapors, and has been employed as "Breathers" with oil storage tank for the reception of discharge vapors.

Tank Gauges.—Used for indicating the contents remaining in tanks.

Tank, Gauging.—Tank used for measuring large quantities of crude oil from wells and pipe lines. The tank is filled, the level is measured by a gauging rod, and then the contents are delivered to the pipe line company.

Tank Outage.—The "shortage" of oil or the difference between the actual contents and the filled contents due to evaporation and leakage.

Tank Station.—Tanks located along a pipe line.

Tank Steamer.—A steamer in which oil is transported in bulk lots, also called tanker.

Tank, Vapor Tight.—Generally refers to a large vertical crude storage tank or refinery distillate tank protected against the leakage of oil vapor by providing metal roofs and by making tight connections between the tank and the roof. There are several patent vapor tight roofs designed to remain tight while provision is made for movement due to expansion and contraction.

Tankage.—The act or process of storing oil, in a tank. The price charged or paid for storage in a tank; the capacity of a tank or tanks; the waste residue deposited in lixiviating vats or tanks.

Tanker.—A ship specially constructed for the transportation of oil.

Tank Strapper.—One who determines the capacity of tanks.

Tap.—A tool for cutting a screw thread inside of a drilled hole.

Tap, Bottoming.—A full threaded tap for tapping a thread clear to the bottom of the drill hole.

Tap Drill.—A drill used for drilling a tapped hole, the drill diameter being slightly greater than the diameter of the tap at the bottom of the threads, but smaller than the outside diameter of same.

Tap, Pipe Thread.—A taper thread tap used for tapping pipe connections, cut with the standard Briggs taper pipe thread.

Tap, Taper.—A tool used to cut threads in a nut or a hole. It is tapered to make it enter easily. A tool to cut threads in a tapered hole.

Tar.—A thick, brown or black, viscous liquid obtained by distillation of wood, coal peat and other organic materials and having a varied composition according to the temperature and material employed in obtaining it.

Tar, Bituminous.—A dark colored liquid or semi-fluid often soluble in water but is soluble in ordinary solvents such as carbon disulphide, benzol, petroleum ether, etc. On distillation this product produces pitch.

Tar, Coal.—The hydrocarbon distillates, mostly unsaturated ring compounds, produced by the destructive distillation of coal.

Tar Distillate.—The paraffin distillate, or distillate containing the paraffin wax. Distillate from tar or residuum still.

Tar, Gas Works.—This is not directly the result of coal distillation but is produced by the cracking of the petroleum oils used for the enrichment of illuminating gas.

Tar Oils.—In general, coal tar distillates are separated into the following commercial fractions: Crude, Naphtha, Light oil, Crude Carbolic Oil, Creosote Oil.

Tar Test.—A test made for the detection of tarry matter in cylinder oil stocks and other oils obtained from the petroleum residuals. This includes the "PRECIPITATION TEST", and consists of dissolving 5 per cent of the oil sample in 95 per cent of freshly distilled petroleum ether.

Tar Well.—A receptacle in which is collected the tarry liquid which separates from the gas when it leaves the condensers.

Tectonic.—Relating to rock structures and forms from deformation of the earth's crust. TECTONICS, is the science or art of construction.

Telescopic Hand Level.—Like the Locke level; also has lenses and stadia hairs.

Tell Tale Flanges.—Observation or testing openings in an oil still.

Temper, To Draw.—Reduce hardness of steel by heat treatment. See: Temper, steel.

Temper Screw.—A screw which hangs from the walking beam used to feed the drilling tools in the cable tool drilling process. This term is taken from another of similar meaning used in mechanics to designate a screw or pin employed to bring a point against a bearing or an object. The temper screw used in drilling cable tool wells does this same thing. It brings or keeps the bit in the hole against the uncut surface.

Temper, Steel.—To control the hardness caused by the chilling or quenching of hot steel by a subsequent heat treating process . This may involve prolonged cooling or reheating and requenching at a lower temperature. A degree of hardness of steel. A quality of heat treatment.

Temperature.—A condition with respect to heat or cold, especially as indicated by the sensation produced or by the thermometer or pyrometer; degree of heat or cold.

Temperature, Centigrade.—A thermometer scale on which water boils at 100°C and freezes at 0°C. Absolute zero is 273°C below the centigrade zero.

Temperature Fahrenheit.—In this thermometer scale water boils at 212°F and freezes at 32°F., above the Fahrenheit zero. Absolute zero is 461°F below the Fahrenheit zero.

Temperature, Normal.—In laboratory investigations 25° C, 77° F. In most of the U. S. Government research work the normal temperature is ordinarily taken at 15° C. or 59° F.

Temperature Coefficient.—A coefficient expressing a quantitative relation between change of temperature and the consequent variation of some other quantity.

Tempering Oil.—A viscous neutral oil, red in color. A steam-refined cylinder stock equivalent to 26° BAUME. Hammer oil is used as a heavy tempering oil, and summer black oil has been recommended for the same purposes.

Tensile Strength.—The strength of a material to resist pulling apart. Also spoken of as "ultimate tensile strength."

Tension.—A state of stress created by forces tending to pull a material apart.

Tension, Interfacial.—The tension existing between two contacted surfaces, notably between the surface of an oil film and the surface of the bearing metal to which it adheres. A theory of lubrication advanced by Southcombe and Wells.

Tension, Surface.—The tension forces existing in the extreme surface film of an exposed liquid surface due to unbalanced cohesive forces within the body of the liquid.

Terrace.—A local flattening of a regional dip.

Terrestrial Vegetation Theory.—A theory of the origin of petroleum where it is assumed that petroleum was produced by heavy pressure.

Test.—To examine or try by means of a reagent, proving light hydrocarbon oils by heat, to find the temperature at which they evolve explosive vapors; an oil test.

Test, Bending.—A test performed for the hardness of wax candles by increasing the temperature until the candle bends 7/16-inch. To determine the deflection of a beam.

Test Burner.—A burner for testing candle power of illuminating oil.

Tetracosane.—A very heavy solid saturated paraffin hydrocarbon. (C_{24} H_{50}). Melting point 50° to 51° F. Specific gravity 0.790 at 60° F.

Tetradecane.—A heavy liquid saturated paraffine hydrocarbon (C_{14} H_{30}) of the kerosene group 45° Be., boiling point 252° C.

Tetrahydroterpene.—C_{10} H_{20} naphthene found in some grades of Russian petroleum. Boiling point 162° to 167° F.

Tetraricontane.—C_{34} H_{66} solid hydrocarbon found in Pennsylvania petroleum. Melting point 71° to 72° F. Specific gravity 0.800 at 80° F.

Textile Oils.—Many oils are used in the textile industries for processing and for lubrication. Among the oils for processing cotton, wool and silk are such oils as castor oil, olive oil, sulphonated oils, neatsfoot oil, etc.

Textile Soaps.—A great variety of special soaps are used by the textile industries for scrubbing fabrics, removing natural gums, softening, dyeing, etc.

Thallene.—C_{32} H_{22} also called Viridine and Petrocene, is a compound first obtained by Morton in 1873 from Pennsylvania oil.

Thermal.—Relating to heat or heating.

Thermal Capacity.—The capacity for absorbing heat in British thermal units. This refers especially to the heat required to raise a given mass of substance from and to a given temperature.

Thermal Conductivity.—Capability of conducting heat; the quantity of heat that passes in unit time through a unit area of a plate whose thickness is unity when its opposite faces differ in temperature by one degree.

Thermal Contents.—The heat quantity contained in a unit weight of a fuel, generally given in terms of British thermal units (B. T. U.), per pound for solid fuels and some oils, per gallon for other oils, or per cubic foot for gas fuels.

Thermal Efficiency.—The ratio of the heat utilized as compared to the total heat unit when its opposite faces differ in temperature by one degree. In heat engines and boilers the ratio of delivered work, or equivalent heat, to the heat received by the apparatus in question.

Thermal Unit.—A unit chosen for the comparison, or calculation of quantities of heat, as the calorie or the British Thermal Unit.

Thermal Units.—B. T. U.—The British thermal unit is the heat required to raise the temperature of one pound of water through one Fahrenheit degree.

Thermal Units, Calorie.—The "great caloric" is the heat required to raise one kilogram of water through one degree centigrade, or from 0° C. to 1° C. The small calorie is the heat required to raise one gram of water through the same temperature.

Thermodynamics.—The science of heat energy and its conversion into mechanical energy; or that branch of the theory of heat that treats of the relations between heat and mechanical work.

Thermometer.—Any device for measuring temperature. An instrument for measuring temperature or heat intensity. It consists of a closed glass tube partly filled with a fluid so arranged that the thin column of the fluid expands and contracts with increased and decreased temperature; the corresponding movement being measured by scale division on the side of the tube. The divisions are marked according to the FAHRENHEIT, CENTIGRADE or REAUMUR systems, all of which are based upon the boiling point and freezing points of water.

Thermometer, Beckman.—A short thermometer which has a range of 5° or 6° C., and graduated in hundredths of a centigrade degree.

Thermometer Calibration.—The adjustment of the divisions or the employment of correction factors for correcting thermometer readings.

Thermometer, Centigrade.—The metric thermometer. Water boils at 100° C. and freezes at 0° C.

Thermometer Error.—A glass thermometer is subject to error and should be callibrated or corrected occasionally to provide for changes in the glass. Glass does not expand at the same rate as mercury, and again glass is continually changing its form for a long time after the manufacture of the thermometer. All of these effects cause error that must be corrected occasionally by comparison with a standard.

Thermometer, Fahrenheit.—A thermometer scale in which water boils at 212° F. and freezes at 32° F.

Thermometer, High Reading.—A special type of thermometer designed for high temperatures, generally made by introducing temperatures, generally made by introducing nitrogen gas above the mercury column under pressure, thus raising the boiling point of the mercury. Mercury boils at a comparatively low temperature and measurements are impossible unless the boiling is suppressed.

Thermometer, Low Reading.—Thermometers for reading low temperatures below freezing point. These instruments use alcohol, ether or some other fluid that has a lower freezing point than mercury.

Thermometer, Reaumur.—A thermometer scale no longer used in this country. Water boils at 80° R. and freezes at 0° R.

Thermostat.—An automatic device for regulating temperature by utilizing the expansion of solids, liquids, or gases, subjected to heat, as in opening or closing the damper of a furnace regulating temperature by the unequal expansion of bodies. A self-acting device controlled by movements due to expansion and contraction of fluids or by expansion differences of metals, generally a brass-iron couple.

Thermostat, Oil Control.—Used in connection with an oil cooler to maintain a uniform lubricating oil temperature.

Thermostatic Radiator Control.—A form of thermostatic by-pass valve used on certain automobile radiators that maintains a constant jacket water temperature on the engine by passing more or less water around the radiator.

Thermo-Syphon Cooling.—Cooling of gas or gasoline engine cylinders by the natural circulation set up by temperature differences in the cylinder and radiator without the use of a pump. The heated column of water rises while the cold column descends in the cooling system.

Thickened Oils.—Mineral oils thickened by dissolving in them small amounts of vulcanized rubber or aluminum soap; they are intended for certain lubricating purposes.

Thickened Oils, Livered.—Oils become thickened and ruined for certain purposes by contamination or by oxidization taking place in storage or on use. Livered oils are frequently encountered in the circulating systems of automobiles, the oil in this case containing masses of gelatinous matter caused by the decomposition of the oil or by metallic soaps due to free fatty acids. Oils are also thickened by wood oil barrel glue which is softened by moisture and finds its way into the oil.

Thickeners.—Petroleum oils are thickened, of which Aluminum Stearate is an example. Castor oil and other fixed oils, including resin oil can be used for the same purpose. Oil distillates can be thickened by the addition of cylinder stocks or other heavy petroleum oils. (BLENDING.)

Thief.—A small cylindrical vessel designed so that it can take a sample liquid from any depth desired. It is lowered into a tank from the top and the sample is taken by pulling a little wire, which opens and closes it. Used by pipe line gaugers to determine per cent of water or B. S. in the oil before taking it into the pipe line system. One per cent water is generally sufficient to cause rejection of the oil.

Thief Hatch.—Gauge Hatch.—An opening provided with a hinged covering on the top of a tank for the gauger to use when he must "thief" a sample of the liquid content.

Thinning, Dilution.—The loss of viscosity with auto oils due to the leakage of gasoline past the pistons, the gasoline diluting the oils due to the leakage of gasoline past the pistons, the gasoline diluting the oils so that a considerable change takes place in the consistency of the oil.

Thinning Limits.—The limit to which a crankcase lubricating oil will absorb gasoline beyond which it rejects further additions.

Thiophene.—$C_4 H_4 S$. Was founded by Kharitchkov in Gronzni petroleum to the extent of one part in one million; the same investigator reported its presence in benzol to the extent of one part per ten million.

Thompson Machine.—A machine for testing the lubricating value of an oil and obtaining the coefficient of friction when used with different bearing metals.

Thread.—A spiral-shaped groove cut on the face of a screw.

Thread, Pipe.—The Briggs taper thread used for pipe ends and pipe fittings.

Thread.—S. A. E. The Standard Automobile Engineers. It is a finer thread than the U. S. Standard for equal size screws and nuts.

Thread, U. S. A. Std.—The standard machine screw and bolt thread used on general machinery. It is a "Vee" thread. The sides of the thread diverge at an angle of 60 degrees and the tops and bottoms are flattened, the width of the flat is one-eighth the pitch.

Thread Cutting.—Small screws and bolts are threaded by dies, either by hand or by machine. The die is screwed on the rod, more accurate threads are cut on the lathe by means of an arrangement of gears and a lead screw which has a changeable ratio of speed to that of the lathe head-stock. The lead screw feeds the cutting tool along the screw that is being cut.

Thread Cutting Oils and Compounds.—Some sort of lubricant is required to reduce the wear on thread cutting dies, and to reduce the power required for the cutting. Formerly lard oil was used exclusively for this purpose, but of late years many excellent cutting compounds have been developed which are more effective and less costly than the old lard oils. A good oil of the mineral oil type is ordinary ENGINE OIL compounded with about 40 per cent of lard oil.

Thread, Whitworth.—An English system, the angle of the thread is 55 degrees, the point and the root of the thread are rounded to a radius of 0.1373× pitch, the depth of the thread is 0.6403× pitch.

Thrust, Axial.—Forces acting along the length or axis of the shaft tending to push it out of the bearings.

Thrust Bearings.—Bearings arranged to take up end thrust of a shaft, either independent bearings or incorporated with the main bearings carrying the radial load.

Thrust, Clutch.—Axial thrust on a shaft caused by clutch springs and wedges.

Thrust, End.—The axial or end forces tending to force a shaft out of the bearings in the direction of the length, AXIAL THRUST.

Thrust Gear.—The end thrust produced by the crowding action of gear teeth, particularly with bevel gears or worm gears.

Thrust, Pistons.—A hydraulic piston and cylinder of the balancing type designed to take up the end thrust on a shaft.

Thurston Tester.—An oil testing machine of the friction type in which the resistance of the bearing is measured with different grades of lubricating oil. This affords a means of comparing the lubricating value of different oils at different temperatures and different rubbing speeds.

Tiffanyite.—A name proposed by Kunz for a hydrocarbon assumed to be present in certain diamonds, namely, those which on this account exhibit flourescence and phosphorescence.

Tight Sand.—A sand, the pores of which are so few or so filled with clay or cementing material that oil or water does not pass freely through it.

Timer.—An electrical device used with internal combustion engines for determining the time that the ignition takes place. It can control the electric ignition spark or the instant at which the fuel oil is injected in a Diesel or semi-Diesel type engine. In the intermittent gas lift method of flowing wells a timer is used.

Timer Advance.—Position of the TIMER that causes ignition to take place before the piston reaches the end of the compression stroke.

Timer Retarded.—Position of timer which causes the ignition to occur after the piston has passed the end of the compression stroke.

Tintometer.—An instrument used for determining the standard colors of oils by a method of comparison.

Titration.—An analytical chemical process known as "Volumetric Analysis." The addition of a measured volume of liquid reagent to a known volume or weight of another substance, until a definite effect takes place. This is generally evidenced by a change in color.

Tong Key.—The sharp steel projection in the tong which grips the pipe.

Tongs.—Tongs is the name of a tool or wrench which may be of any size to fit upon and to screw casing, tubing and pipe.

Tool Dresser.—The driller's assistant at an oil well; a junior driller.

Tool Extractor.—An implement for grasping and withdrawing drilling tools, when broken or detached in a bore, as of an oil well, etc. Called also Tool Grab.

Tool Joint.—An especially designed and threaded screw joint used in connecting up tools and drilling stems of drilling wells. A standard tool joint is specified by the American Petroleum Institute.

Tool Pusher.—Head driller in charge of the property. A foreman in charge of strings of drilling tools.

Toolie.—A tool dresser, the man who sharpens the drilling tools.

Topography.—The science of surveying the physical features of a district or region and the art of delineating them on maps. The physical features of a district or region such as are represented on maps, taken collectively; especially the relief and contour of the land.

Topographic High.—Frequently in the oil fields to indicate the higher elevations, regardless of age; opposed to topographic low, which indicates a lower elevation.

Topping.—Also known as "stripping" or "skimming." The practice of distilling only the light gasoline and burning oil fractions from the crude petroleum and using the heavier oils for fuel oil.

Topping Plant.—A refinery designed to remove only the gasoline and kerosene fractions.

Tops.—The light fractions of crude petroleum which are removed by distillation in a topping or skimming plant. It contains the gasoline fraction of crude oil.

Top Water.—Water which enters an oil or gas well from a sand above the productive sand.

Torbanehill Mineral.—Torbanehill mineral was evidently the most important of the first bituminous minerals obtained from the Scotch fields.

Torbanite.—A peculiar kind of shale which occurs in New South Wales, Australia, mined and distilled at Torbane.

Torch Oil.—The product described under paint oil is also used as a torch oil.

Torpedo.—An explosive cartridge or shell lowered or dropped into a well and exploded to clear the well of obstructions or to open communications with a source of oil supply.

Torpedoing.—Same as shooting.

Torque.—Turning effort or twisting effort exerted by an engine or motor in turning shafting or wheels, given in POUND-FEET or POUND-INCHES. With a given horsepower the torque decreases with an increase in speed, and vice versa.

Torsional Deflection.—The amount of movement obtained by the application of torsion to the shaft. The "Amount of Twist" in edges.

Torsion-Balance.—An instrument used in geopraphical prospecting.

Torsion Viscosimeter.—A type of Viscosimeter in which the damping effect of the viscous fluid is measured by a torsionally stressed wire. Thus, when a wire is twisted, and a disc is hung from the lower end, the torsional resistance of the wire will tend to keep the disc swinging back and forth in air, but with the disc immersed in oil the motion will be damped down in proportion to the viscosity of the oil. The ABSOLUTE VISCOSITY can be measured in this way. The Doolittle viscosimeter is an example.

Toulene.—C_7 H_8 has been found to be invariably present in petroleum stock; the usual color is water-white and the gravity is about 55° Be.

Tour.—The word which designates the shift of a drilling crew or other oil field workers is pronounced usually as if it were spelled t-o-w-e-r-. The word does not refer to the derrick or tower, as some seem to think.

Trace.—An amount that can be detected but is not large enough to be measured.

Trap, Gas.—See: Separator. A closed steel tank which is provided to receive gas and mixed oil, separate the gas from oil or other liquids and automatically discharge the gas and liquid into separate delivery pipe lines.

Trap Pressure.—Pressure held at the trap, or oil and gas separator.

Transcurrent.—Same as strike lift fault.

Transformer Oil.—The main requirements for oils for high-tension electrical transformers are freedom from water and mineral acids; further they show little or no volatility at 100° C. Those machine oils derived from petroleum which have a flash point of over 160° C. (open test), with a volatility of less than 0.1 per cent in five hours at 100° C., provided they satisfy the electrical requirements, are suitable for use in transformers.

Transit, or Transit Theodolite.—A surveying instrument with the telescope mounted so that it can be transited, or moved in any desired plane while making observations. An instrument used by a surveyor to lay out straight lines, levels, and angles upon the earth or in spherical construction work.

Translucent.—Admitting the passage of light, as milk quarts, but not capable of being seen through.

Transmission Grease.—A semi-fluid grease having sufficient adherence to cling to the teeth at high speeds, and must be fluid enough to freely enter the tooth spaces and flow around the gears. It must not "track" nor be cut into permanent cavities by the gears, and yet must be thick enough so that it does not leak through the joints in the transmission case. The use of solid fillers is generally prohibited for the reason that such fillers would have a bad effect on the ball and roller bearings contained in the transmission. Grease is generally better in winter than oil, for the oil usually congeals at low temperatures and makes gear shifting difficult while the grease is easily sheared by the teeth at almost any temperature.

Transmission Oils.—When oils are used in the automobile transmission they generally consist of steam refined cylinder oil having a viscosity of about 245" Saybolt Universal at 210° F., a flash point of 610° F., fire test of 710° F., and cold test of 30° F. This is satisfactory in all except the coldest weather, at which time it may be necessary to thin out the oil with a little thin lubricating distillate oil so that gear shifting will be easier.

Transportation, Pipe Line.—Crude oils are piped from the wells to the refineries through pipes at high pressures, this means of transportation being much cheaper and more satisfactory than by railroad tank car. Relay pumping stations are installed at intervals along the line, one station picking up the oil from the next. Natural gas is transported through extensive pipe line systems in much the same manner as oil. Compressors are used in place of pumps. Some very large lines are used.

Traveling Block.—The block containing sheaves and provided with clevis and hook which is connected with the load hoisted or lowered in a derrick.

Traveling-Valve.—A part of a plunger in a deep well pump.

Traverse.—In mapping to make a traverse survey. A line surveyed across a plot of ground.

Traverse Survey.—A survey in which a series of lines joined end to end are completely determined as to the length and azimuth.

Treating.—The art of purifying petroleum intermediates by agitation with chemicals, or by physical absorbents, in a specially constructed type apparatus known as an agitator or washer.

Trenton.—Of, pertaining to, or designating a division of the North American Silurian formation, highly developed in the Appalachian region and in the interior.

Triangulation.—The operation and immediate result of measuring the angles of a network of triangles laid out on the earth's surface by marking their vertices.

Tricosane.—Tricosane C_{23} H_{48} has been separated from Pennsylvania petroleum.

Tridecane.—C_{13} H_{28} paraffin extracted from Pennsylvania petroleum.

Trimo Wrench.—A pipe wrench.

Trinidad Asphalt.—Natural asphalt from a lake in the Island of Trinidad much used for street paving, waterproofing, etc.

Trinidad Pitch.—The deposit of solid or semi-solid bitumen constituting the Pitch Lake of Trinidad.

Tripoli.—A whitish, fine granular, porous, silicious rock. In some deposits it is soft enough to be crushed in the hand. It lacks colloidal quality when mixed with water.

Trolley.—A traveling roller overhead support used to suspend a load or a hoist. A contact roller on a pole of an electric locomotive.

Trunk Pipe Lines.—Main lines of transportation joining two important points.

Tube Clamp.—A clamp, or clip, for gripping a tube or pipe; especially a jawed tool used in hoisting and lowering well tubes. Seldom used in practice. See elevator.

Tube Filter.—A strainer on a driven well tube to keep out grit.

Tube Sheet.—The sheet in a boiler which is perforated to receive the boiler tubes.

Tubing.—The conduit, usually of metal, through which oil or gas is removed from a well.

Tubing Block.—A sheave block used to travel and hoist tubing by means of a wire line hoist.

Tubing Catcher.—A device with slips provided to catch tubing in case same is dropped in a well.

Tubing Hanger.—See: Tubing Catcher.

Tubular Goods.—The term covering all classes of pipe, casing and tubing used in drilling or operating oil or gas wells. Specifications as of A. P. I.

Tufa.—Porous rock deposit formed by spirngs and streams.

Tuff.—Another name for "Tufa."

Tug-Rim.—A grooved pulley, generally has two grooves, and bolts to the side of a bandwheel for the purpose of carrying bull ropes which drive the bull wheel.

Tunnel Bearing Grease.—Used for lubricating the main engine and propeller shaft of ships in the shaft "tunnel." It comes in blocks of about 56 pounds, which fit into the openings provided in the tunnel bearings.

Turbine Oil.—A mineral oil adapted for the lubrication of the heaviest types of horizontal turbines should possess a high flash test and low viscosity and should retain its body and efficiency under warm temperatures. It should be filtered to a bright yellow color and should not absorb moisture.

Turbine Oils, Steam.—Oils for the lubrication of steam turbines are straight mineral oils of the non-emulsifying type. They are used in closed circulating systems and therefore must be free from acids and sediment or any other substance that would lead to the formation of soaps and froth. For small turbines the viscosity is about 150″ Saybolt Universal with a flash point of 420° F. For larger turbines a low viscosity oil is also used but with a considerably higher flash point.

Turbine Oils, Reduction Gears.—Steam turbines of the impulse type run at very high speeds, hence it is sometimes necessary to gear them down to the required speed of the electric generator or propeller to which they may be attached. This gearing is a very accurately cut

helical, or herringbone helical gearing, which requires very careful and continuous lubrication. A medium viscosity non-emulsifying petroleum machine oil is used for this purpose, which is sprayed on the gears by a rotary pump.

Turkey Red Oil.—See: SULPHONATED CASTOR OIL. Used for degumming silk and for dyeing cotton fabrics with turkey red color.

Tur-min-tine.—A trade name for petroleum turpentine substitute.

Turpentine Substitute.—Mineral oils used as substitutes for turpentine as solvents in paints, inks and cleaners. They are petroleum products midway of kerosene and gasoline, gravity from 42° to 58° Be. They must evaporate like turpentine and at the same rate without leaving residues or discolorations.

Turrelite.—A Texas asphalt rock, a shelly mass cemented together by bitumen.

Twaddell Hydrometer.—A hydrometer scale used among tar distillers divided into degrees. It is used ordinarily for liquids lighter than water. To convert Twaddell degrees into specific gravity, multiply the Twaddell degrees by 5, add 1000, and divide the result by 1000.

Twist Drill.—A drill used in factors shape, etc., by machinists to drill holes into metal, as distinguished from flat drill.

Twist Off.—To break the dril pipe in the hole, usually by torsional stress.

Two-cycle Engine.—An internal combustion engine that gives one working stroke per revolution for each cylinder, the events of suction, compression, ignition, expansion and expulsion being all completed in one revolution.

U

U-Tube.—A "U" shaped glass tube.

Uintaite.—See: Gilsonite.

Ultimate Analysis.—The extreme chemical analysis of a compound showing the proportions of the elements or the classification of the atoms. Thus, the ultimate anaylsis will give the carbon, hydrogen, oxygen or nitrogen content of the compound and not the proportions of elementary compounds such as methane, decane, etc.

Ultimate Production.—The total accumulated production that is recovered from a well or a pool in a given time or during the life of the same.

Ultimate Strength.—The breaking strength of a material.

Unconformity.—Lack of continuity between strata. Discordance in attitude with underlying rocks, due to overlap or to lapse in deposition, during which the rocks beneath were deformed or partly eroded away, or both. A surface separating two series of rocks which indicates a pronounced time. Intervals between the period of formation of the two series is called an unconformity .

Under Ream.—To enlarge a drill-hole below the casing.

Under Reamer.—An oil-well tool used for enlarging the hole below a drive shoe, etc.

Unguent.—A salve for burns, cuts or bruises, stiffer than a liniment but softer than a cerate.

Union.—A coupling with tight seats wihch are pressed together by means of a single screwed nut. A convenient coupling used to connect up small and medium sized pipes. A flanged union sometimes used to connect large pipes is pressed together by means of bolts.

Uniflow Engines.—A steam engine having piston controlled exhaust ports at the center of the cylinder and steam admission valves in the cylinder head. Steam therefore flows in one direction through the cylinder reducing condensation losses.

Universal Joints.—Articulated joints permitting the transmission of rotary motion with shafts at an angle other than a straight angle. Used extensively on automobiles where the angle of the propeller shaft is constantly changing when driving over rough ground.

Unsaturated.—Having the property of taking on additional products such as the halogen elements without giving up hydrogen; such as the olefine and acetylene series, etc.

Untest Stock.—Partially reduced steam-refined stock; a mixture of light ends and distillate from which the naphtha content is usually removed in a steam still; steam refined stock diluted with naphtha for filtering or cold settling.

Urpethite.—A yellowish brown to brown mineral having the consistency of soft tallow and a specific gravity of 0.885, melts at 39° C., and is readily soluble in cold ether. Urpethite constitutes about four-fifths of Urpeth colliery ezokerite.

Uplift.—Elevation of any extensive part of the earth's surface relatively to some other part; opposed to subsidence.

Upset End Joint.—A reinforced joint in rotary drill pipe.

Upthrow.—The block or mass of rock on that side of a fault which has been displaced relatively upward. The term should be used with the definite understanding that it refers merely to a relative and not an absolute displacement.

Upper Valve.—A traveling valve. See Traveling Valve.

Upthrust.—An upheaval of rocks; said preferably of a violent upheaval; used also attributely.

Urphetite.—A yellowish brown to brown mineral having the consistence of soft tallow and specific gravity of 0.885; it melts at 39° C., and is readily soluble in cold ether. Urpethite constitutes about four-fifths of Urpeth colliery ozokerite.

Usoline.—A proprietary name for liquid petrolatum.

V

Vacuum.—A space evacuated of all gases and vapors. Because of practical reasons a perfect vacuum has not been obtained and even with the highest evacuation possible there are some residual vapors and gases. Vacuum is commonly used to describe some degree of pressure which is reduced below the pressure of the atmosphere. The degree of vacuum is measured by the differential between the atmos-

phere and the reduced pressure as shown in inches of mercury in a glass "U" tube.

Vacuum Distillation.—The distillation of lubricating oils under a partial vacuum to reduce the temperature and to prevent decomposition or cracking of the hydrocarbons. Very heavy oils can be distilled in this way without distributing their structure.

Vacuum Gauge.—A gauge for indicating the degree of vacuum, usually expressed in terms of inches of mercury, or in millimeters of mercury for laboratory determinations. This can be in the form of an ordinary direct reading spring gauge or a simple mercury column or "U" tube.

Vacuum Pump.—A pump designed to draw into itself gas, or steam at reduced pressure and to discharge such above the atmospheric pressure. There are wet and dry vacuum pumps; and hand and power ones.

Vacuum Pump, Steam Condenser.—A pump used with a steam engine or steam turbine condensing plant for removing air and non-condensable gas from the vacuum condensing chamber when used in this way it is a dry vacuum pump, but when it pumps all the condensing water as well as the gas it is a wet vacuum pump.

Vacuum Regulator.—A valve and diaphram which controls the opening of same in the reverse manner from that of a pressure regulator. This regulator is used to control low pressures and pressure below the atmosphere, often used on casing head gas lines.

Valve.—Any contrivance as a lid, cover, ball or slide, that opens and closed a passage, whether by lifting and falling, sliding, swinging or rotating as at the opening of or inserted in any pipe, tube, outlet, inlet, etc., to control the flow or supply of liquids, gases or other shifting material.

Valve, Angle.—A valve which has the inlet and the outlet openings at an angle, usually at 90 degrees.

Valve, Gate.—A valve with a sliding wedge which closes and opens by being advanced or withdrawn from a VEE shaped seat. Also called Straight Way Valve.

Valve, Globe.—A valve that has the seat designed to permit the valve to close on top of it. The body is generally round like a globe.

Valve, Regulator.—A valve designed to regulate the pressure of either intake or discharge when for intake it is designed to operate contrary to the way it does for regulation of discharge.

Valve, Straight Way.—A valve which provides a straight passage when open.

Valve, Three Way.—A valve which has three ports arranged so that fluid entering one may be directed through either of the other two ports.

Vanadium.—Va. A metallic element often used in alloy steel to reduce the effect of fatigue and crystallization of the metal.

Vapor.—Any substance in the gaseous state, under conditions where it is capable of being liquefied either by pressure or cooling alone.

Vapor Density.—The relative weight of a gas or vapor compared with some specific standard such as hydrogen or air.

Vapor Density, Relative.—The weight of a vapor compared with the weight of an equal volume of some other gas such as air or hydrogen. This is also called the "specific density". The weight of a given column of gas or vapor to that of the same volume of hydrogen measured at N. T. P. (1 cc of hydrogen weights 0.00009 gram). It follows from Avogadro's Law that the vapor density = ½ molecular weight.

Vapor, Oil.—The vapor of the heavier fuels, such as kerosene, solar oil, gas-oil, etc., is produced by heating the oil in a special vaporizer, as none of these fuels produce sufficient vapor to run an engine at ordinary temperatures. This heating of the oil spray can be accomplished in a special sort of carbureter or inside of cylinder itself, care being taken not to heat the oil to the cracking point, at which solid carbon will be deposited.

Vapor Phase Cracking.—The cracking or decomposition of a hydrocarbon while in the form of a vapor as distinguished from "liquid phase cracking" in which the hydrocarbon exists as a liquid.

Vaporimeter.—An instrument for measuring the volume or the tension of a vapor.

Vaporization, Latent Heat Of.—The heat necessary to evaporate a unit amount of liquid without a change in the temperature. Heat that disappears in the process of evaporation.

Vapor Pressure.—The pressure of the vapor which has escaped from the liquid is called vapor pressure.

Vapor Tension.—Vapor tension or vapor pressure is of the most importance with gasoline or other light volatile fuel intended for use in a carbureter. It is upon the vapor pressure that we depend for starting the cold engine. The vapor tension or pressure varies among different grades being greatest at a given temperature for the lighter and more volatile gasolines and the lowest for the heavy grades. Alcohol and benzol have approximately the same vapor pressure or tension. The vapor pressure of two fuels of equal totality when mixed together gives the mixture greater volatility than either of the liquids alone, and in some cases it is nearly equal to the sum of the vapor tensions.

Varnish Makers' Naphtha.—Both deodorized naphtha 58° to 60° Be., and turpentine substitute of 52° Be., gravity are used by varnish manufacturers.

Vasegen, Vasogen.—Oxygenated vaseline. A vehicle for applying iodine, ichthyol, salicylic acid, etc., in the treatment of skin diseases.

Vaseline, Vaselene, Vaselin.—A yellowish, translucent, semi-solid petroleum product used in ointments and pomades, as a lubricant and in other ways; a form of petrolatum.

Vaselon.—A mixture of Maragon and stearon dissolved in mineral oil; it resembles petroleum and is used as an ointment base.

Ventilators.—A steel outlet placed upon the roof of a building to allow impure or over heated air, or vapors to escape.

Verifier.—A tool used in deep drilling for detaching and bringing to the surface portions of the wall of the drill-hole at any desired depth.

Vernier.—Instrument named for its inventor, Pierre Vernier. Used for measuring a fractional part of one of the divisions of the graduated fixed scale or arc.

Viscometer, Viscosimeter.—An instrument used for determining the viscosity or the fluidity of a liquid.

Viscosine.—A Russian lubricating oil which possesses a specific gravity of 0.925, a flash point of 290° to 310°C; and an Engler viscosity of 5 minutes at 100°C.

Viscosity.—The property of an oil that determines its rate of flow and is closely related to its internal friction; it is a measure of the degree of its fluidity. The measure of fluidity is the time in seconds required for a given volume at 60°F., to flow through a given aperture.

Viscosity, Absolute.—That force which will move 1 square centimeter of a plane surface with a speed of 1 centimeter per second relative to another parallel plane surface from which it is separated by a film of the liquid 1 millimeter thick.

Viscosity, Critical.—The point at which friction changes from decreasing to increasing as the viscosity of the lubricant is increased.

Viscosity, Practical Measurement.—The practical instruments used for the measurement of viscosity and standardized by governments and technical societies are generally of the "orifice" type in which the oil is allowed to flow through a standard diameter orifice at a given temperature. The time taken in seconds for a standard quality of oil to flow through the orifice is taken as the "viscosity number" and is of course an arbitrary unit which has no direct relation to the ABSOLUTE VISCOSITY or shearing force in dynes. Testing by orifice type to visco meters given comparative values which require calculation for reduction to absolute force units. Saybolt, Engler, etc., are examples.

Viscosity, Specific.—The force given in absolute units necessary to move a layer of liquid one square centimeter area over the same size parallel surface one centimeter distant with a velocity of one centimeter per second. This unit is the POISE. Generally the viscosity of water is taken as unity at zero degrees centigrade, and the viscosity of other liquids are referred to this resistance. For water at zero degrees centigrade, the specific viscosity is 0.018086.

Viscous.—Adhesive or sticky, and having a ropy or glutinous consistency.

Viscous Neutral Oils.—Oils having a viscosity above 135 at 100°F.

Volatile.—Easily wasting away by evaporation; readily vaporizable, e. g. those fractions of bituminous materials which will evaporate at climatic temperatures.

Volatility.—The ease with which a liquid is converted into a vaporous state or the relative amount of heat required to vaporize the liquid. A "Volatile" liquid is one which readily vaporizes at comparatively low temperatures or forms great volumes of vapor at a given temperature.

Volatility Test.—A fractional distillation test made by standard methods in which the "initial boiling point" and the "End point" are noted. With a small amount of low boiling point fractions or initial, the engine will start readily in cold weather but the evaporation

loss in storage will be excessive during warm weather and the power will be somewhat reduced. With a large percentage of high boiling point components starting will be difficult even in mild weather, there is likely to be trouble with manifold "Loading" or flooding, and because of the poor vaporization it is likely that there will be excessive carbon deposits and trouble from overheating.

Volatile Matter, Coal.—The hydrocarbon compounds or tarry matter contained in coal which can be distilled off by the application of heat, leaving a mass of coke or solid carbon.

Volt.—The unit of electrical force or pressure. This is the force that is supposed to cause the flow of current in a circuit.

Voltmeter.—A direct reading instrument for determining the voltage.

Volumetric Analysis.—The analysis of a compound by determining the quantity of a standard solution required to satisfy a reaction in a known quantity of the compound.

Volute.—A curve resembling a spiral.

Volute Pump.—A centrifugal type pump having a volute form outer casing.

Vulcan Oil.—Name given to a very heavy distillate which has a specific gravity ranging from 0.910 to 0.960. It is used to some extent for lubricating.

W

Walchowite.—A yellow, resinous oxygenated hydrocarbon which occurs in brown coal at Walchow in Moravia; it has a specific gravity of 1.0 to 1,069 fuses to a yellow oil at 250°C and forms a dark brown solution in sulphuric acid.

Walk Out.—To follow up a prominent bench in order to plot structure by contours.

Walk Way.—A walk provided along side the belt house of a drilling or pumping well.

Walking Beam.—An oscillating bar or beam, pivoted at the center and free to rock up and down. In oil derricks, the walking beam carries the string of drilling tools at one end and is connected to a crank at the other, the rotation of the crank causing the tools to lift and drop and thus to drill the hole by concussion. Also used to actuate a deep well pump.

Wall Hook Packer.—A packer which supports itself against the walls of casing.

Wantage Rod.—A gage rod for measuring the outage of a barrel, tank, or tank car.

Warp.—To deflect from a normal position.

Wash.—To pass a gas through or over a liquid for the purpose of purifying it. To cleanse or purify by agitation with a liquid which may contain cleaners, such as acid, alkali, or clay.

Washdown Spear.—A fishing tool used in rotary drilling.

Washer.—An apparatus in which gas is washed; a scrubber.

Washing Oil.—In stripping toluol from the waste gases, an absorbent or washing oil is used. This is a gas oil purified or a MINERAL SEAL OIL having a low olefine contents. It must not cloud below 25°F., and must quickly and completely separate from water with which it is mixed and shaken.

Waste.—A mass of threads of fibers used for cleaning machinery or for absorbing and holding lubricating oil for the lubrication of certain types of bearings. It may be cotton or wool waste, depending upon the requirements.

Watch Oil.—The oil obtained from the dolphin, blackfish or "snuffer" is used for lubricating the delicate machinery in watches and clocks.

Water Analysis.—Waters from rivers, lakes, ponds, springs, wells and cisterns contain many mineral salts in solution as well as some organic matter in many cases. The salts consist largely of magnesium and calcium salts which make the water "hard" but traces of other minerals such as iron are also found. Dissolved gases also occur naturally, such as ammonia, sulphur dioxide and sulphurated hydrogen. Potassium and sodium are contained in many western "alkali waters", but only in very small percentages with most natural products. Organic matter in large quantities makes the water dangerous to drink, but has no effect on its industrial use.

Water, Boiler Feed.—The water which is fed into a boiler while it is in service. Clean, soft water is most to be desired. Impure and hard water should be treated before it is fed to a boiler. Mineral deposits from hard water causes burned tubes and sheets; also interferes with heat transfer. Alkali water causes the boiler to foam and to carry over water spray and mineral salts with steam, thus seriously affecting the cylinder lubrication when fatty oils are compounded with the mineral cylinder stock. The alkalis saponify the fatty oils and make a troublesome lather. Water in engine cylinders burst the heads and may wreck the engine.

Water Cone.—Water cones are sometimes supposed to be created when water is present below the oil in a well. This is usually effected by allowing the well to produce too rapidly. The cure to some extent can be effected by pressure control.

Water, Distilled.—Water purified by the distillation process which frees it from mineral and solid matter if carefully carried out. Repeated distillations are frequently necessary, however, to free the water from such dissolved gases as ammonia, sulphur dioxide, etc. Distilled water will pick up silica if stored for any length of time in glass bottles for pure water dissolves glass silica in small quantities.

Water Finder.—An instrument used to ascertaining the amount of water in a tank of oil. A "thief".

Water Gage.—A device with glass tube to show water level in a boiler. A cock on a boiler head to determine the water level.

Water Gas.—A combustible gas used for industrial heating and as a gas engine fuel. It burns with a blue flame, unless enriched with the vapors of petroleum oil. Water gas is the result of passing steam through deep beds of incandescent coal where it is decomposed and increases the yield of carbon monoxide and methane, both combustible gases.

Water Gas Tars.—Tars produced by cracking oil vapors in the manufacture of carbureted water gas.

Water Leg.—The side wall of a fire box of a locomotive type boiler.

Water Seal.—A seal formed by water to prevent the passage of gas.

Water Soluble Oils.—Oils having the property of forming permanent emulsions or almost clear solutions with water.

Water String.—A string of casing used to shut off all water above an oil sand. It is often necessary to run more than one string before a well is completed.

Water Table.—To top frame of a derrick which supports the crownblock. The opening through the water table varies with different size derricks. The A. P. I. Standard derricks give this opening as 4′ and 4″ for derricks that are 66′ high, while the opening is 5′ and 6″ for all derricks 80′ in height or greater.

Water Well.—A well yielding water and no oil, irrespective of the purpose for which it was drilled.

Water White.—A grade of color in oil, defined as plus 25 in the scale of the Lovibond or Tagliabue colorimeter, usually obtained in three grades:

Gravity	First Test
45° Be.	170° F.
47°	150°
78°	120°

Watt.—An electrical unit of power or activity equal to work done at the rate of 1 joule a second, or at the rate of work represented by a current of 1 ampere under a pressure of 1 volt. A horsepower is equal to 746 watts.

Wax Distillate.—Neutral oil distillate before the separation of paraffin wax.

Wax Oil.—The immediate base from which paraffin was and neutral oils are manufactured.

Wax, Paraffine, Paraffin.—Paraffine wax is wax occurring more principally in the residuals of paraffin base petroleums, although it also occurs in limited quantities in the "mixed base" crudes and to a still smaller extent in the asphalt base oils. It is removed by pressing sweating and filtering from the WAX DISTILLATES taken from the tar stills. When thoroughly refined it is a pure white wax having an unctious surface and is industrially of great importance. It is insoluble in water, combustible, stable and not subject to decomposition at ordinary temperatures.

Wax, Paraffine Grades.—The fully refined paraffine waxes offered on the American market are graded according to their melting point, which varies commercially from 115°F. to 132°F., in seven grades. The crude and "special" paraffine waxes are named as well as listed by melting point, such as match wax white crude, scale wax, yellow crude wax, semi-refined wax, and special white wax.

Wax Press.—A machine for squeezing the free oil out of the crude paraffine distillate which leaves the paraffine wax ready for sweating. Some oil is retained in the paraffine no matter what the squeezing or pressing process may be, and thus is sweated out of wax by subjecting it to high temperatures in shallow pans.

Wax Slop.—A heavy cut of oil obtained in the process of "running to cylinder stock".

Wax Tailings.—A heavy distillate obtained during the final stages of distilling certain mixed base oils down to coke. The product contains anthracene and chrysene produced by cracking. It is a dark-green color, but darkens on exposure to light; is asphaltic in nature and varies in melting point according to the care with which it is separated and later refined. It is used for weather and waterproofing compounds, in some cases as a flux in street paving mixtures, and as a filler in very cheap axle grease.

Weathering.—Exposure of wild casing head gasoline to the air or heating it, as with steam, to allow the lighter vapors to escape into the air.

Weathering Oils.—When crude oils are exposed to the weather there is a loss due to the evaporation of the volatile constituents and oxidization of the heavier residuals with a tendency toward developing the asphaltic contents with asphaltic oils. Weathering lubricating oils bleaches them and decomposes certain of the hydrocarbons so that there is a decided change in the gravity and viscosity.

Weeping Core.—This term is applied to a core cut from a formation, which when brought to the surface becomes covered with drops of fluid that have the general appearance of tears. Singularly enough, such a formation usually is found to be low in its production of oil.

Weighing Machine.—An instrument to indicate, and in some designs record, the load upon the sucker rods of a pumping well; also, used on pull rods of central powers.

Weight Indicator.—An apparatus for recording and indicating the tension upon a drilling line in the rotary drilling method.

Weight of Oils.—The weight of an oil can be found by multiplying the weight of an equal volume of water by the specific gravity of an oil at the same temperature. Thus, if pure water weighs 8.34 pounds per gallon at a certain temperature and if the specific gravity of the oil is 0.900, then the weight of oil per gallon will be: 8.34 x 0.900 equals 7.506 lbs. per gallon.

Welding Compounds. — Compounds used for cleaning metallic oxides from the metal at the point where the weld it to take place.

Well.—A shaft or hole sunk into the earth to obtain oil, gas, water, etc., when oil or gas is discovered in commercial quantities it is spoken of as a "well", but before such discovery, it is a drilling well. In case no oil or gas in commercial quantities, even if water is found, it is a "dry hole". A well also is called a producer.

Westphal Balance.—A form of balance used in determining the specific gravity of liquids, minerals, fragments, etc.

Western Specific Gravity Balance. — An exceedingly accurate method of determining the specific gravity of a fluid by weighing on a specially devised balance.

Westrumite.—In 1903, Westrum patented the use of a soluble oil, such as that of Boleg, in admixture with a large quantity of water, for the sprinkling of roads with the object of laying dust.

Wet Gas.—Natural gas that contains more or less oil vapors. It occurs with or immediately above the oil. Sometimes called casing-head gas.

Wet Natural Gas.—Natural gas which contains readily condensible gasoline. A fraction of a gallon to as much as ten gallons or more has been extracted from one thousand cubic feet of wet gas by actual field tests.

Wet Steam.—Steam containing free moisture or water spray, or water in excess of that required for complete saturation at a given pressure and temperature.

Wheelerite.—A yellowish resin, found in the cretaceous beds of northern New Mexico, filling the fissures of the lignite, or interstratified in thin layers in it; it is soluble in ether.

Whipstock.—A round steel shaft designed to set in a well at some predetermined depth for the purpose of defecting the drilling tools. The upper end is a long taper like the old buggy whipstock from which it gets its name; used in side tracking.

White Oil.—An odorless and colorless oil possessing a specific gravity of 0.857. It is used medicinally and as a base for creams, paraffin, petrolatum.

White Spirit.—The turpentine substitutes used in the manufacture of varnishes and paints sold in England as "white spirit", have generally a flash point about 23° C., mostly at 26.7° C., yield 90 per cent of distillate up to 140° C., have a specific gravity of about 0.785 and are characterized by a mild odor.

Whitworth Thread.—See Thread.

Wick Feed System.—A wick oil from the supply well to the bearing by capillary attraction, the lower end of the wick dipping in the oil while the upper end touches the shaft.

Widemouth Socket.—A fishing tool, in which the socket is fitted with a bell mouth nearly the full size of the casing.

Wildcat.—A well in an unproved territory; it makes no difference if prospects are good or bad. This is analogous to "prospect" in mining. An individual or corporation devoted to exploration far from where oil is actually known to exist.

Wildcatter.—One who drills wells in the hope of finding oil in territory not known to be an oil field.

Wild Well.—An oil well, the flow of which has not been brought under control.

Winch.—A hoisting machine; a geared drum with handles for hand hoisting.

Winter Black Oil.—A heavy car and engine oil from petroleum residuals and thinned down with a liquid petroleum distillate. Used for the lubrication of shafting, tempering or slushing. Solidification temperature below 20° F.

Wire Drawn.—An expression used in steam engineering for the condition where the pressure is reduced in the cylinder by the friction of only slightly open valves.

Wire Rope.—A flexible cable made up of iron or steel wires. Several wires are twisted up into a strand and then a number of strands are twisted up to form the rope so that great flexibility is had. In some cases a central hemp core may be used to supply lubricant to the wires. As the wires slide back and forth over each other when the

rope is bent over a pulley, lubrication must be supplied to prevent wear.

Wire Strand.—A few wires twisted up to form a stiff, strong rope suitable for guys or other supports but not suitable for passing over pulleys. A portion of a wire rope.

Wood Alcohol, Methyl Alcohol.—A poisonous alcohol obtained by the destructive distillation of woody fibers. Used as a varnish solvent, etc.

Wood Emulsion Paste.—A mixture of lard oil and stearic acid which is saponified by the addition of caustic soda. DEGRAS is sometimes used in place of the lard oil.

Wool Grease, Degras.—This is a thick smooth grease or semi-solid fat made from SUINT or crude wool grease. It makes very stable emulsions with water and is used as a compounding agent for cylinder oils, and oil for dressing leather or for making pastes and greases. In a highly purified form it is called LANOLINE grease much used for ointments, pomades, etc.

Wool Stocks.—Sun-bleached neutral oil, compounded with lard oil to make a rich, creamy emulsion.

Working Barrel.—The body of a pump used in oil wells. A cylinder within which is contained the working parts of a well pump.

Working Interest.—The share or portion of the minerals obtained by, and belonging to the lessee.

Worm Gear.—A speed reduction device consisting of a screw (worm) meshed with the teeth of a gear wheel specially designed with slanting teeth to accommodate the threads of the worm. As the teeth of the worm slide on the teeth of the gear, lubricants must be continuoulsly applied to prevent heating and cutting. It is the usual practice to use a steel worm with a bronze worm wheel to reduce the friction and the tendency toward cutting. The worm wheel is generally immersed in a bath of lubricating oil.

Worm Gear Oil.—The product described under transmission oil is said to be satisfactory for worm gears.

Wrench.—A tool made to grip a nut or a pipe and provided with a handle or lever with which to turn and screw the part so gripped.

Wrought Iron.—Malleable iron which is aggregated from pasty particles without subsequent fusion and contains so little carbon that it does not harden usefully when cooled rapidly.

Wurtzilite.—A Utah asphaltic mineral, which is jet black by reflected light and deep red in thin plates; it softens in hot water, toughens, and becomes more elastic; in a candle flame it softens and burns with a bright flame; it is practically insoluble in gasoline of 76° Be., partly soluble in ether, carbon disulphide and turpentine.

X

Xylene.—Coal tar products occurring in three isomeric forms, orthozylene, metazylene and parazylene. They are all found in coal-tar and in some of the distillates. Used principally for solvents, gener-

ally in an impure state. Sometimes referred to as "synthetic gasolines", but are really straight coal tar products. C_8 H_{10} hydrocarbon found in Rangoon oil by De la Rue and Muller, and in Pennsylvania oil by Schorlemmer.

Xylidine.—Three products occurring in isomeric form: Meta, Ortho and Para.

Xylol.—Any of the metameric dimethyl benzenes.

Xyloretinite.—A white resin fusing at 165° C., derived by FORCHHAMMER through the action of alcohol on fossil pine wood from the marshes of Holtegaard in Denmark.

Y

Yellow Dog.—This is the field name for a derrick lamp, a vessel made of tin or light iron with two spouts into which wicks of cotton are inserted and as they absorb oil from the body of the lamp they give off a very yellow light, hence, the name "Yellow Dog."

Yellow Ozokerine.—A product resembling vaseline, but less homogenous, produced from crude ozokerite; it is used in ointments and pomades.

Yellow Wax.—A viscous semi-solid, not very volatile obtained from still residuum, resulting from coal tar distillation. Contains some anthracine C_{14} H_{10} and other hydrocarbons of complex structure.

Yield.—The proportion of oil or gas, etc., obtained in mining. Extraction; Recovery.

Z

Zayafkes.—A Russian prospecting license which gives the owner the right to prospect and examine for oil for a certain period, during which time, the owner has the right to select a portion of land within each plot. Should oil be discovered, an otvod, or official permit is obtained which gives the right to work the property.

Zero Oils.—Oils congealing at zero Fahrenheit.

Zietrisikite.—A mineral resembling ozokerite in most physical characters and in composition but almost completely insoluble in ether and melting at 90° C.

Zloty.—Polish currency. Par value, 1 zloty is equal to 9.513d.

Zone of Capillary.—An area that overlies the zone of saturation and contains capillary voids, some or all of which are filled with liquid that is held above the zone of saturation by molecular attraction acting against gravity.

Zone of Saturation.—An area which contains capillary or supercapillary voids, or both that are full of liquid that will move under ordinary hydrostatic pressure.

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